American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—January, 1882.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

JANUARY 4, 1882.—The Society met at 8 P. M. Vice-President Welch in the Chair. Ballots were canvassed, and the following candidates declared elected: As Members, Onward Bates, Dardenne, Mo.; William Wingfield Bonnyn, Montreal, Canada; Samuel L. Felton, Jr., Columbus, O.; Charles E. Greene, Ann Arbor, Mich.; Thomas W. Jaycox, Leadville, Col.; Mirtiliano Sicard, Ibague, U. S. of Colombia. As Associate, George Henry Frost, New York. As Juniors, James Peter Bogart, New Haven, Ct.; Arthur Haviland, Jaltipan, Mexico.

Messrs. Bogart, Dresser, Emery, Wm. H. Paine and C. V. Smith were appointed a committee to arrange details for the Annual Meeting on the 18th inst.

Illustrations forwarded to the Society by Charles O. Gleim, Cor. Member, A. S. C. E., of the iron cross-ties and sleepers now in use on the Prussian Government Railroads, were presented by the Secretary, and the subject discussed.

THE ANNUAL MEETING.

JANUARY 18, 1882.—The Society was called to order, in Annual Meeting, at 10 A. M. Vice-President Ashbel Welch, in the Chair, and present also the Members whose names are given in a list subjoined.

Edward A. Doane and James Owen were appointed tellers of the ballots to be canvassed.

The Annual Report of the Board of Direction, the Annual Report of the Treasurer, and the Report of the Finance Committee were presented, read by the Secretary, and accepted.

A report by the Committee on a Uniform System for Tests of Cements, was read, accepted, and the Committee continued.

REPORT OF THE COMMITTEE ON A UNIFORM SYSTEM FOR TESTS OF CEMENTS.

The Committee appointed for the purpose of devising a uniform system for tests of cements, report that but little has been done during the last year towards the accomplishment of their duty, owing first, to the inability of its Chairman to give the requisite time to the subject, on account of domestic afflictions and his pressing professional duties as Chief Engineer of the Chicago, Milwaukee and St. Paul Railway; and secondly, for the reason that the Members of the Society have not responded, excepted in two instances, to the call of the Society for samples of American sand for experimental examination by the said Chairman. To devise uniformity of tests of mortars composed of cement and sand, requires each experimenter to have sand of about the same characteristics, therefore, in specifying the quality of sand to be used for test purposes, the Committee should recommend such as may readily be procured in all parts of the country, if possible.

In conclusion, I would respectfully request that the Secretary be requested to issue a circular to Members, calling their attention to the subject, and requesting samples of sand from, say 30 to 40 different localities, properly distributed, so that when received the same shall represent fairly the quality in each locality.

Respectfully submitted,

D. J. WHITTEMORE,
Chairman.

The Secretary presented the canvass of suggestions by Members as to the place for the next Convention of the Society, viz.: Washington, 48; San Francisco, 16; Chicago, 8; St. Paul, 4; New York, 3; Baltimore, 2; New Orleans, 1; Boston, 1; Denver, 1; Atlanta, 1; Pittsburgh, 1; Milwaukee, 1; Richmond, 1; Buffalo, 1; St. Louis, 1; Cleveland, 1; Louisville, 1; Minneapolis, 1; Troy, 1; Yellow Stone Park, 1; White

Sulphur Springs, 1 ; Some City on the Mississippi, 1 ; Leon, Mexico, 1. On motion, it was resolved that the Convention be held at Washington, D. C., and the Board of Direction was requested to determine and announce the date.

The tellers presented the canvass of the ballot for officers, and the following Members were declared elected as officers of the Society for the ensuing year :

President :—Ashbel Welch.

Vice-Presidents :—James B. Eads, William H. Paine.

Secretary and Librarian :—John Bogart.

Treasurer :—J. James R. Croes.

Directors :—Thomas C. Keefer, Thomas L. Casey, Joseph P. Davis, George S. Greene, Jr., George W. Dresser.

Remarks of Mr. Ashbel Welch on taking the Chair, upon his election as President of the American Society of Civil Engineers, January 18, 1882.

I take this occasion to return my thanks to the members of the American Society of Civil Engineers, present and absent, for the honor they have conferred on me by choosing me for their president. And I desire to express my appreciation of the honor thus conferred of being first in place in this Society, which comprises so many of the most eminent engineers in the United States and Canada, including several of the most distinguished officers of the army and navy of the United States, and including, also, engineers in every quarter of the civilized world. Among the applications for admission which we have received within the last few months, some were from the remotest States of the American Union, about half a dozen were from Canada proper, one was from the British province of New Brunswick, three from Mexico, one from the United States of Columbia, one from the Republic of Chili, one from England, and one from India beyond the Ganges. Thus our Society, and the works executed by its members, are among the ties that are uniting the nations of the earth into one family.

But it is not only or mainly the number and eminence of its members, and the vast territory whose engineering they largely represent, which make the distinctions conferred by this Society so honorable, but it is especially the character for integrity and high-toned professional honor which pervades the Society, and which has gained for it universal respect.

Much of the advantage of being a member of this Society comes from the presumption it raises of professional integrity as well as professional skill. The office of engineer is largely judicial. He is arbiter between proprietor and contractor. His hand is on the purse-strings. What the capitalist wants is that the engineer whom he entrusts to ex-

pend his money and do his work, shall do it honestly as well as skilfully. The contractor wants to feel sure that the engineer, into whose power he puts himself when he signs the contract, will do him justice. No responsible contractor will bid for work under an engineer whom he does not suppose to be honest, except at a high price. Thus the cost of a work may be very much affected by the character as well as the ability of the engineer.

As in all offices of trust, the engineer is paid not only for his labor and skill but for his character for integrity.

In order that the endorsement which membership of this Society gives should be as valuable as possible, their own reputation should be carefully guarded, not by legislation or regulations, not by censorship, but by the caution and firmness and honor of those who are asked to recommend candidates for admission, and by the pressure of a wholesome professional public sentiment similar to that which preserves the purity of the bench, and of the army and navy.

The Board of Censors, to award the Norman Medal, reported that in consequence of the illness of one of their number, their duties were not yet completed. Leave was granted to this Board to report at a subsequent meeting of the Society.

The report of the Committee on a Uniform Standard of Time was presented through the Chairman, Mr. Sandford Fleming, as follows :

The Committee appointed to consider the paper on Standard Time, for Railway and other purposes, read at the Montreal Convention, June, 1881, beg leave to report :

REPORT OF THE SPECIAL COMMITTEE ON STANDARD TIME.

The Committee have examined the question referred to them, and fully recognize its great public importance. Practically it resolves itself into a proposition to reform our general time system. But difficulties of a peculiar nature present themselves. The Committee does not consider the problem insolvable ; but from its character it is clear that no single association, and that no one individual can solve it. Every member of society is interested in it, and it becomes necessary to consult many interests in order that general concurrence in any change be obtained.

Since the subject was brought under the notice of the Society in June last it has been taken into consideration by other associations : by the American Association for the Advancement of Science, at Cincinnati ; by the American Metrological Society, in New York ; by the Association for the Reform and Codification of the Law of Nations, at Cologne, Prussia ; by the International Geographical Congress, at Venice, Italy.

The members of the Committee have, since their appointment, conferred individually with many persons. They find it admitted on all sides that standard time for general use throughout the country is urgently demanded, and that the time has arrived when action should be taken.

That the question is one of importance, it is only necessary to glance at the existing condition of our time service. Mistakes in the hour of the day are frequent. In every city or town—in every State—discrepancies are met which produce great aggregate inconvenience. Thousands of engagements are broken. Innumerable disappointments and losses result. In some cases loss of life is caused, and generally in consequence of defects in our time system, difficulties more or less serious constantly are experienced.

These difficulties are not confined to this country. They are experienced in all civilized communities where lines of rapid communication have been established. In the papers before the Committee it is urged that the question is one which affects every nationality, and therefore any change which may be proposed for this country should be such as to commend itself to other nations for adoption, so as ultimately to become universal.

The time system which we follow has been in use for centuries. It certainly answered all the purposes of mankind when there were no railways, no steamboats, and no telegraphs. In some respects the general advancement of civilized communities has outgrown the old custom: the yearly march of events more and more rendering it obsolete, and calling for reform to meet the condition of the age in which we live.

The Committee anticipate difficulty in effecting a desirable reform as no change in a matter of this kind can be effected without interfering in a greater or less degree with long established usages and fixed habits of thought. The importance of the question, however, appears to the Committee to justify a united effort to obtain as complete a reform as may be desirable and possible.

The Committee feels assured that the general intelligence of the Community will cordially sympathize with an earnest movement to bring about such modifications in our time system as may be practicable and beneficial.

The people of the old world are influeuced by traditional customs, and generally are attached to usages on account of their antiquity. They may adhere even to imperfections,—which years have made venerable. On this continent this feeling is modified. Americans are not, to the same extent, disposed to cling to conventional forms when these forms interfere with public convenience, or when they retard progress. It is, therefore, clear to the committee that we cannot remain passive until other nations take the initiative in Time reform. For in this country the imperious power of custom is less difficult to overcome.

If it be considered that the initiation of such a time system as the age demands properly falls within the province of the people of America, it becomes the more necessary that we should make earnest efforts to ascertain what best will meet the requirements of the hour, and prove most generally beneficial to our own generation and those which follow us.

The Committee holds it expedient to obtain an expression of opinion on the various points which present themselves, from as large a number of practical and scientific men as possible. They consider it essential to have the views of those who have been and are now engaged in connection with the great lines of transportation in every State, and Province between the two Oceans.

Accordingly the Committee begs leave to recommend that such papers on Standard Time as they may consider necessary to set forth the subjects, be printed, and, all who are prominently connected with Railway and Telegraph enterprises, or are in any way interested in the consideration of the question in the United States, in Canada, and in Mexico, be cordially invited to send replies to the series of questions which have been prepared, with the view of obtaining all shades of opinion.

The Committee more particularly draw attention to propositions 13 to 20 in the scheme which accompanies this.

It has been held by those who have given attention to the subject that no scheme of time reform can be considered complete without provision for the ultimate removal of a defect familiar to many. The Committee accordingly direct attention to the suggestions submitted under the heading "Divisions of the day into hours."

The Committee respectfully recommend that authority be granted by the Society to invite the co-operation of other scientific associations, and that of other bodies in the furtherance of this important object, and that all such Societies and government departments interested be invited in the name of the Society to attend a general convention to meet at New York or Washington on a day hereafter to be named, for the purpose of determining the Time System advisable to adopt.

SANDFORD FLEMING,

Chairman.

On motion, the report was accepted.

The following resolutions, offered by Mr. William G. Hamilton, were adopted:

Moved by Mr. W. G. Hamilton.

Seconded by Mr. Worthen.

Resolved, That the report of the Special Committee on Standard Time be accepted; and that the Committee are hereby requested to take such steps as they may consider necessary to obtain information to enable them to report definitely at a future meeting.

Resolved, That authority is hereby given to the Committee to co-operate with other associations in furtherance of this important subject.

Resolved, That authority is hereby granted to the President of this Society to invite other societies interested, and that representatives of the State Governments, representatives of the Dominion of Canada, the Republic of Mexico, and the various departments of the General Government at Washington, be invited to meet in a convention, as set forth in the report.

Gen. T. G. Ellis, member of the Committee, said :

Mr. PRESIDENT : I am requested to say something of what was spoken of in the meeting of the Committee on Standard Time. We had present with us at the meeting Prof. Cleveland Abbe, who is connected with the Signal Service, and he made some statements as to what the Government is doing in Washington.

They have proposed to set up a standard clock in the basement of one of the buildings in Washington, to keep, as nearly as possible, the exact time. The clock is to be manufactured by the Waltham Company, in Massachusetts, and will be ready for delivery some time in February. The clock is to be as fine and well constructed as possible. They propose to set it up where the temperature will not vary more than one degree in the year. They have been in the habit of receiving time signals from all the principal observatories in the country, and these vary from one to ten seconds in their estimate and computation of what is known as Washington time ; they receive these signals now. They propose when this clock is up to receive these signals and return to these observatories what the actual time is. Then these different observatories will both receive and transmit the signals from different places, so as to give the exact mean time. And they propose, whether anything is done or not by this Society, to establish a standard and uniform time for the Signal Service ; they intend to do that irrespective of other arrangements. Prof. Abbe says that there have been arrangements made for the Mail Service and other services to have everything done upon a uniform standard of time. There seems to be a disposition at Washington to establish a uniform standard of time, and do away with local time. I think if other societies or other bodies do not take some step in it, that the subject may be presented to Congress, and some wrong step may be made, so that this Committee, in view of all the circumstances and of what has been done and what has been proposed, thought it would be an excellent plan to correspond with the departments and get at their views before making any definite recommendation.

The Committee on Preservation of Timber reported, through Vice-President Chanute, Chairman of the Committee, that very few answers had been received to the circulars heretofore issued, and that the committee proposed seeking further information upon the subject, and hoped to present a report at the next convention.

The Committee was continued.

Proposed amendments to the Constitution were then discussed.

Proposed amendment to Article XXII.

Add at end of the article, as follows:

Any member or associate, whose subscription is not in arrears, may compound for future annual subscriptions by the payment of three hundred dollars, if he is a resident, and of one hundred and fifty dollars, if he is a non-resident. But should a non-resident become a resident he shall pay the remainder of the composition, viz., one hundred and fifty dollars, or the usual annual subscription during the time of his residence.

Mr. G. Bouscaren, by letter, said:

I had hoped to reply before this to your invitation to discuss the report of the Finance Committee on the proposed amendment for compounding annual dues by one payment, and regret exceedingly that my occupation at the present time will not allow me to give this subject all the attention that it deserves.

Believing the question to be one of great importance concerning the future welfare of our Association, I trust that the Society will not finally pronounce upon it until both sides have been thoroughly and fairly considered.

The adverse conclusions of the Committee seem to be based chiefly on the supposition that the effect of the proposed measure would be a marked decrease in the financial resources of the Society for the first twenty years following. Admitting the mathematical correctness of the calculation, I would suggest in support of the proposed amendment:

1st. That the assumption made in the calculation, that compounding would be generally followed by members, can hardly be sustained, being contrary to actual practice in other societies where the same privilege exists.

2d. That the compounding money, once paid, would be an assurance against eventual loss of annual dues from death, resignation or incapacity to pay.

3d. The privilege of compounding does not seem to have had a depressing influence on the English and French societies, who are both in very flourishing condition, with comfortable and convenient homes, and large amounts permanently invested, this being attributable principally to their numerous memberships, the amounts of the annual and compounding dues being less in each of them than for the American Society, as shown by the following comparison:

		Annual Due.	Compounding.	
English Society....	Resident Members.....	4 guineas.	50 guineas.	
	Non-resident Members...	3 "	25 "	
French Society....	All Members.....	25 francs.	600 francs.	
American Society..	Resident Members.....	25 dollars.	300 dollars.	Proposed.
	Non-resident Members...	15 "	150 "	Proposed.

MEMBERSHIP (1881).

English Institution	(all paying classes).....	3,957
French "	"	1,817
American "	"	about 550

I believe that the prosperity of the Society in the future does not depend so much on the amount paid by each member as on the ability of the Society to recruit a large membership, and one of the first conditions to accomplish this is a liberal Constitution, granting the same privileges as are granted in other societies to facilitate the payment of dues.

Col. WILLIAM E. MERRILL, by letter, said :

I had intended making a careful investigation into the matter of commutation of dues, proposed by five members of the Society of which I was one, but, unfortunately, I was suddenly summoned to Washington on business, and was unable to do so. I have thought it best, however, to submit a few remarks that I hope may be found pertinent.

To my mind the pecuniary question resolves itself into this :

What is the present value of $15 per year paid by members of the American Society of Civil Engineers, or, what is the present value of an annuity of $15 per year, which will continue as long as the average life of the members of this particular Society ?

The answer to this is purely a question of mathematics, if we can decide upon :

1. A proper rate of interest.
2. An average length of life of members of the Society.

If we can assume, as I think we may, that the length of life of our members will come up to the average of American experience, we will have the following :

AGE.	EXPECTATION OF LIFE.
35	31.8
36	31.1
37	30.4
38	29.6
39	28.9
40	28.2
41	27.5
42	26.7
43	26.0
44	25.3
45	24.5
46	23.8
47	23.1
48	22.4
49	21.6
50	20.9

If, for example, we assume that the average age of our members is 40 years, the probable average duration of the annual payments will be

28.2 years. If we assume 45 as the average age, the average duration of payments will be 24.5 years.

The following is the formula for determining the present value of an annuity which will run a given number of years:

$$a = \frac{b}{r}\left(1 - \frac{1}{(1+r)^t}\right),$$

in which

a = present value of the annuity.
b = the annual payment.
t = the number of years.
r = the annual interest on one dollar.

(See Davies & Peck, Dictionary of Mathematics, p. 30.)

I have not had time to apply this formula to many cases, but I have worked out the following:

Average Age.	Rate of Interest.	
	4 per cent.	6 per cent.
40	250.92	201.66
44	235.98	192.77
45	231.54	190.03

I would therefore suggest that the proper way to settle this matter, on a basis that will be unassailable, will be to ascertain the age of each member of the Society, and after the average age has thus been determined, to obtain the opinion of a reliable actuary, as to the rate of interest that should be charged, and the "Expectation of Life" that should be assumed for members of this particular profession.

When these main points are fairly established, then the Society will be able to judge of the actual cash value of its annual income, and can fix a fair sum for the composition of dues.

I will not dwell on the arguments in favor of compounding—such as the advantage of having a *certain*, even if small, income, enough to keep the Society together if all other sources fail—the importance of saving high interest by paying our building debt—the great mutations incident to the profession of Civil Engineering, which often make it easier to pay a lump sum in flush times than constant annual fees—the example of sister societies abroad, &c., &c.; because I understand that other members will enlarge on these considerations.

In conclusion, I must apologize for the late date of this letter, but I have been unexpectedly hindered.

The report of the Finance Committee on the subject of compounding annual dues by one payment, already issued in circular form and printed in Proceedings, Vol. VII; October, 1881, p. 102, was read; the conclusion of that report being as follows :

"With these facts before us, and in the present state of our finances, when our expenses so nearly correspond with our income, we cannot recommend any basis for compounding dues which shall tend to lessen our present annual income.

The plan of compounding the dues of members on the basis proposed would tend to seriously lessen our annual income. And the more generally this plan came into practice, the greater would be our financial embarrassment.

The only amounts that, under the present circumstances, would be safe to adopt would be so large as to appear unreasonable, and tend to discourage members from compounding.

While we look with favor upon the plan of compounding dues as having for its object the permanent and best interests of the Society, and which, if in successful operation, would in time accomplish all that might be expected of it, yet we fear that its introduction at the present time might so seriously embarrass the Society financially as to jeopardize those important interests which this plan was especially designed to subserve.

We therefore recommend that this proposed amendment to the Constitution be not adopted."

Respectfully submitted,

W. H. PAINE,
JOS. P. DAVIS,
C. V. SMITH,
Committee on Finance.

On motion, it was resolved : That this Annual Meeting recommends to the Society that the above proposed amendment to Article XXII, is injudicious in the present condition of the Society and that it should not be adopted.

The following resolution was offered by Mr. William G. Hamilton, and seconded : That any member of the Society who may have given $500 to the Building Fund, or who may give $500 to that fund during the next three years, shall be made a life member from the date of such payment, and shall be exempt from annual dues.

Mr. William P. Shinn made the point of order that to effect the object of this resolution, would require the regular forms provided for an amendment to the Constitution.

The motion was lost.

The following proposed amendment was then discussed :

Proposed amendment to Article XXIV.

After the words "Fellowship Fund" at the end of the first line, insert the words, "Ten Thousand Dollars of which shall be," so as to read : "There shall be a fund called the Fellowship Fund, ten thousand dollars of which shall be devoted exclusively to the publication of the papers read before the Society," &c., &c.

Also add at the close of the article, the words, "Fellows shall be elected in the same manner as Honorary Members."

Mr. O. Chanute.—I may explain, in connection with this proposed amendment, that the Fellowship Fund has been practically dead for six years. There has been during that time but one accession to the Fellows of the Society. That fund was originally pledged to the publication of papers read before the Society. The interest received from it is wholly inadequate to paying any considerable portion of the cost of the publications of the Society, and the necessity of having a fund of that kind has practically passed. The amount of that fund is now about $9,000, and the annual interest would be $450. It is not proposed to take any portion of the fund which has accrued for other uses ; but it is proposed to devote future accretions as the members of the Society may think best to determine ; for that purpose we propose to limit the amount specifically pledged to the publications to the sum of $10,000, or $1,000 more than has been gathered, and to leave the disposition of future accretions to be hereafter determined ; for that purpose a few verbal changes are proposed in the article.

On motion, it was resolved, that this Annual Meeting recommends to the Society the adoption of the above proposed amendment to Article XXIV.

The following proposed amendment was then discussed :

Proposed amendment to Article V. :

Second line by striking out the word "five" and inserting the word "ten," so that it shall read "ten Directors."

The Article will then read : Article V.—The officers of the Society shall consist of a President, two Vice-Presidents, a Secretary, Treasurer, Librarian, and ten Directors, &c , &c.

In response to an inquiry, it was explained that the Society was organized under the Laws of the State of New York, and that those laws required that a majority of the Board of Direction should constitute a quorum.

Mr. William E. Worthen.—This amendment is one of my proposition. From my experience on the Nominating Committee, having been twice Chairman, I have seen the necessity that non-resident members should be represented by more Directors in our Board. Under the present system, out of ten, there can be only four non-residents, which in the ticket just elected consists of President, one Vice-President, and two Directors. As a quorum is essential for the transaction of business, it has involved what seemed to be a necessity to have a majority of the

officers, or six, as residents. Our new President, who was Vice-President last year, and our last President, although non-residents, have attended many of the Directors' meetings, and it seems to me, that by proper selection from non-resident members in our vicinage, we shall be as sure of a quorum as from residents. I would like that, as far as possible, the United States should be represented on the Board of Direction. The amendment was proposed to bring the matter before the Society ; it can be changed or amended as we see fit.

Mr. Theodore Cooper.—Mr. Chairman : Mr. Joseph P. Davis, one of the proposers of the amendment, was called away, and wished me to express his changed opinion in regard to the proposed amendment. The idea is to increase the number of the Board of Direction. The law requires that the quorum shall be a majority of the whole Board. All that have been present at these meetings know the difficulty of getting together a quorum of the Board of Direction. The Secretary has to drum very loudly at times to get a quorum together. It seems to me that the more you increase the number, the more you increase the difficulty. A majority should be resident members, or members within limits such that they can come to the meetings, or they cannot have a quorum. If the Secretary has to drum up fifteen Directors, his duties are going to be largely increased. How it is going to benefit the Society by increasing the number I do not see. We cannot take members from a distance to represent the United States, for if we do we will destroy the possibility of a quorum.

Mr. William E. Worthen.—In that view we had better have one Director. It seems to me it is a National Society, and the nation should be represented. I have been on the Board of Direction, and I understand the difficulties of getting a quorum, but I do not see why people cannot come to the necessary meetings from a little distance as well as people right here. At present, we may say, there are four outside members—the President from New Jersey, the first Vice-President from St. Louis, the first Director from Canada, and the second one from Washington. We distributed it around as well as we could. It does seem to me that if we could put in somebody from Philadelphia, Boston, Springfield and Hartford, it would add a great deal to our Society, and make it more national.

Mr. Theodore Cooper.—I appreciate the fact that the Society should be represented abroad, but how is it to be done ? The gentleman has limited it to a *little* distance from New York. That will not cover the United States. Is it necessary to thus represent the United States ?

Mr. William E. Worthen.—The four that we have got out of the city are about as well distributed as possible, but if there were more Directors the vicinity might be here represented.

Mr. Cooper knows what the trouble is of making up a ticket. It is difficult to suit all meridians.

Mr. Charles H. Fisher.—It is suggested that you enlarge your Board of Directors; make twenty-five if necessary and let there be from these an executive committee of four or five appointed, composed of those who reside in the city, and give them full power. Of course, it would require some constitutional amendment. It would nationalize the society so far as having its officers live in all parts of the country, and yet there will be the power concentrated—leaving the rights in the hands of the full committee.

Mr. J. J. Croes.—The law requires that the majority of the Trustees should form a quorum for the transaction of business I do not know whether that majority has a right to delegate their powers to a small minority. I think it highly probable that in some matters the transactions of such a committee could be upset by any persons disposed to make trouble. The difficulty of getting a quorum which equally exists, as to those members who live away and those who live in New York, is very great. As it is, if you increase the number you increase the difficulty. There have been twenty meetings of the Board of Direction, called for various purposes since the last annual meeting. You can see that when a Director lives in Philadelphia, who is in active business, it costs him something in time and in money to attend all the meetings of the Board of Direction. We have had an offer to pay the expenses of a Director from that city, but I fear the gentleman who made it would back out.

Mr. William E. Worthen.—Was there a quorum in all our meetings?

Mr. J. J. R. Croes.—I do not know sir.

Mr. Wm. P. Shinn.—I believe there is no motion before this meeting.

The Chair.—The subject of this amendment is before the meeting.

Mr. William P. Shinn.—I sympatbize with the object which Mr. Worthen desired to attain by his amendment. I am always in favor of doing all we can in any way to nationalize the society, but I doubt the plan simply for the reason that it is difficult to get a quorum together. I thought of making the suggestion that Mr. Fisher made, but I had the same doubt about its legality. For the purpose of bringing the matter to a point, I *move*, that this meeting recommends that the amendment should not be passed or adopted, and that the subject be referred to the incoming Board with the request that they obtain information upon the point as to whether the Board of Direction can be increased and can delegate its power to a committee composed of the minority of the Board; and in case they find that it can be done, to submit their amendment to the constitution for action at the next meeting.

Mr. Theodore Cooper.—There is a clause in the By-Laws providing for an executive committee; the action of the executive committee is legal, only after it is endorsed by a quorum of the Board of Directors,

at a future meeting. They are acting without authority until then ; then it becomes perfectly legal. That is the principle, as I understand it, of all executive committees.

The SECRETARY read clause referred to by Mr. Cooper, viz.: By-Laws, Section 18. "The Board of Direction shall provide for an executive committee to act in the absence of a quorum or during the intervals between meetings."

MR. WILLIAM E. WORTHEN.—How many times during the year has there been a quorum of Directors ? How many meetings would be necessary ? It seems to me there is need of but very few. May be more than when I was a Director. We did not have twenty meetings.

The SECRETARY.—One of the most important subjects which the Board of Direction has to consider, is the passing upon applications for membership. There has been a feeling among the members of the Board of Direction for several years past, that that was a duty, and that as many as possible of the Board ought to be present when it was attended to ; outside of that there is a good portion of the business of the Board that could be done by committees ; there are certain points where it would be absolutely necessary to have a quorum of the Board.

MR. WILLIAM E. WORTHEN.—Could not that be submitted to each member of the Board of Direction by letter ?

The SECRETARY.—I tried that, and the members of the Board—not myself—the members of the Board did not like it. They thought that discussion and talk over an applicant's fitness was an important element in passing upon the application.

MR. THEODORE COOPER.—There are many new members of the Board of Direction who come in, like all new members of boards, prepared to reform everything that has been done in the past. Only by attending the meetings, and hearing the discussions, can a Director fully understand the condition of this Society. If you appoint half-a-dozen members, scattered all the way from Canada to Mexico, and who know nothing of the internal action of the Society, it will not tend to improve the condition of the Society, for they have no ready means of entering into the discussion with the other Directors or knowing what has been done in the past. The gentleman, whom I stated before I represented, Mr. Davis, formerly resided in Boston. If I understood him properly at that time, he did not believe as he does now, that the managers in New York are doing the best for the Society that circumstances will permit. During the past year he has been a resident member of the Board of Direction, and understands clearly the difficulties to be met by the Board in their management of our affairs. Now that is the trouble ; we have a number of Directors who have never come to our meetings ; they never know what is going on. I think, if you could get them all to attend, it would be well to have more Directors, but until that can be accomplished, I can see no benefit from increasing their number.

Mr. Geo. W. Dresser.—I think, as to the principle of this amendment, it is not good policy in the management of any corporation to have too large a Board of Directors. There is no great efficiency gained by a large Board, while the difficulty of obtaining a quorum would be greater if you increased the number of Directors. I think and suggest it would be better to keep things just as they are.

A Member.—Pay the Directors five dollars each, every time they come.

Mr. J. J. R. Croes.—By the rules of the Institution of Civil Engineers of England, a record is kept of the members of their Board present at each meeting, and it is read at the annual meetings, and those members who have attended the least are ineligible for re-election. The difficulty in the discussion of this matter is, there is too much talk of sectionalism. We are a National Society, and I am sure, that every member of the Board feels that, as much as every member that lives in Kalamazoo or Kamschatka. There is too much talk about that, because the question where a man lives does not make any difference in regard to the Society; it is only a question as to the practical management of the business operations of the Society, and unless those members live reasonably near New York, you cannot get them to attend. Here are four members of the Board that can be scattered around fifty miles; Mr. Worthen has mentioned that they come from Missouri and Canada; those can be shifted around, and still there will be a representation of these gentlemen from the outside; but I know from my recollection of the meetings of the Board of Direction, that we do not hear from those gentlemen, or get any suggestions from them once a year—from those gentlemen who are communicated with at least every month by the Secretary. All papers and circulars are sent to them, and they are requested to say what they have to say; but they do not say it, nor do they come. But as to any feeling because New Yorkers are by the law obliged to attend to the actual business management, I do not think that it is fair to advance that kind of sectional and provincial argument.

Mr. M. M. Tidd.—This is the first time I have heard anything of sectionalism. It comes from the New York members now. I have been well satisfied with the manner in which matters have been managed; I have been highly and well satisfied, and no doubt I shall always be.

Mr. J. J. R. Croes.—That gentleman has not had the privilege of seeing the correspondence of the Secretary.

A motion was then made that this Annual Meeting recommends to the Society that the above proposed amendment to Article V of the Constitution be not adopted.

The Chair.—The motion is seconded. All in favor of the motion, that this amendment be not recommended, will say aye.

The motion was carried.

The Chair.—The amendment is not recommended. The other resolution was—will Mr. Shinn please repeat in his own words?

MR. WM. P. SHINN.—I think, after the discussion that has taken place, I will withdraw the motion in regard to requesting the Board to investigate the legality.

The CHAIR.—Then the motion is withdrawn.

The following proposed amendment was then discussed :

Proposed amendment to Article XXXIII. :

Strike out the word "October" in the third line and substitute therefore the word "November."

Also strike out the word "February" in the eighth line and substitute the word "March."

It was explained that these were merely verbal changes made desirable by the change of the date of the Annual Meeting from November to January.

On motion, it was resolved, that this Annual Meeting recommends to the Society the adoption of the above proposed amendments to Article XXXIII.

The Committee on the Gauging of Streams presented the following report :

REPORT OF THE COMMITTEE ON THE GAUGING OF STREAMS.

NEW YORK, January 18, 1882.

The Committee on the Gauging of Streams have the honor to present some gaugings of the Connecticut River at Hanover, N. H., made under the direction of Prof. Robert Fletcher, A. S. C. E., during the past summer, giving the details of the operations and the flow of the stream in a very dry season.

The Committee have to repeat what has been reported to the Society before, that the difficulty of creating an interest in the subject of stream gauging among those persons who are in position to have such gaugings made as will be useful, has been most discouraging to them, and they request that the Committee be discontinued.

Respectfully submitted,

J. J. R. CROES,
Chairman.

THEO. G. ELLIS.

On motion, the report was received and the Committee discontinued.

The Secretary announced details of programme for the next day.

The meeting, at 1 P. M., took a recess for lunch, which was served in the Society House.

The session was resumed at 2.30 P. M.

The Board of Direction presented the following report on the subject of Tests of Iron, Steel and other metals :

REPORT OF THE BOARD OF DIRECTION.

AMERICAN SOCIETY OF CIVIL ENGINEERS,
127 EAST TWENTY-THIRD STREET,
NEW YORK, January 17, 1882.

The Board of Direction herewith transmits to the Society the report made to it by the Committee appointed at the last Annual Convention "to examine further into the subject of Tests of Iron and Steel, and other Metals," &c., &c.

REPORT OF THE COMMITTEE ON THE SUBJECT OF TESTS OF IRON, STEEL AND OTHER METALS.

The Committee of the American Society of Civil Engineers, appointed at the Convention at Montreal, June 17th, 1881, to "examine further into the subject of Tests of Iron, Steel and other Metals, and to report a recommendation to the Board of Direction, who shall take such action as they see fit," beg respectfully to report that they have had a number of meetings and have as a Committee consulted with two members of the late U. S. Board for Testing Iron, Steel and other Metals, and have individually consulted with three members of this Board, also with a number of manufacturers of different metals in different parts of the United States.

Your Committee do not understand it to be within their province to discuss the work of the U. S. Board. The unavoidable delay incurred by it in getting the testing machine at Watertown built, tended to weaken the public belief in the necessity for the existence of such a Board, and no doubt helped to strengthen the opposition made to appropriations for its use.

They find that the Board has done a large amount of valuable work in developing a comprehensive scheme of tests, and in carrying a few of these to completion. For all this it deserves the hearty thanks of scientific men.

Your Committee are of the opinion that it is of the utmost importance that Congress should appoint a Commission to superintend a systematic series of tests of structural materials, and should place in the hands of this Commission such sums by annual appropriation as may be necessary for the successful prosecution of the work; and with instructions to commence at once with a series of tests which will be so practical as to convince the people of the United States of the necessity which exists of having such tests made; while at the same time the Commission should be instructed to carry on the scientific tests which have, so far as the public is concerned, only a theoretical interest.

It is our opinion that these practical tests should be made on structures which the public use, such as beams, bridges—and the various members of which these are composed—columns, wire cables, and other materials used in construction, in which the public has a direct interest.

Your Committee do not consider it of so much importance by whom the work is done, as that it should be done, and that the results should be published, both for the benefit of the public and of the engineering professions, with the least possible delay.

We think that it is desirable to have the work of such a Commission carried on under Government auspices, either by a civil commission alone, or by a civil commission associated with the officers representing the Engineering Corps both of the Army and Navy.

All the chemical and physical experiments made by this Commission should be systematically recorded; and published as soon as there are enough of them to make it worth while; without comment at first, so that they may be discussed by all the scientific men of the country, with a view of having a large number of expert opinions previous to publishing the results for the practical use of the professions interested.

Your Committee also think it probable that it is wisest that the U. S. Testing Machine should remain where it is. They think, however, that it should at once be brought up to its maximum of efficiency, and that it should be open to the use of the public, when not actually in the service of the Commission; and that one of the conditions of its use should be that the parties using it should allow the results to be published by the Commission.

This Committee are also of opinion, that the Commission to be appointed should be composed either of ten civil engineers, or of five civil engineers and five officers of the Staff Department of the Army and Navy; the civil engineers to be members of the American Society of Civil Engineers, the American Institute of Mining Engineers, or the American Society of Mechanical Engineers,* and to be appointed by the President of the United States; that it should be the duty of this Commission to organize itself, and to receive and account for all appropriations made for this work, to employ all necessary assistance for carrying on the work, to arrange plans for work to be done, and for the purchase of the necessary materials; to arrange in general how tests are to be made, and the forms of reports from assistants to the Commission; to arrange for a distribution of these preliminary reports to experts, requesting criticisms and suggestions from the persons receiving them; to make up the final report; to report to the proper department both as to accounts and work done; to distribute or direct the distribution of the final report in such manner that copies of the same shall be distributed among engineers and other parties having direct interest in the scientific and practical results ascertained, in preference to the usual methods of distributing the same.

That the *necessary* expenses of members of the Commission shall be paid from the appropriations.

That in case no commission be authorized by Government, a permanent committee be appointed by the Society to institute by any means in their power the carrying out of tests such as are most needed and the spread of information thus gained, through the medium of the Society's publications.

It is the opinion of your Committee that a Committee with power to act in

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* It has been learned by a comparison of the lists of members of these Societies that most of the members of the Am. Soc. Civ. Engs. who could serve on such a committee are also members of the Am. Inst. Min. Engs, and of the Am. Soc. Mechan. Engs.

the name of this Society should be appointed with the least possible delay ; and that they should ask all the engineering societies, technological schools, learned societies and colleges of the country to co-operate with them in influencing Congress to appoint a Commission who should be entrusted with the whole subject of preparing and making tests of all the materials used for structural and engineering purposes.

All which is respectfully submitted,

THOS. EGLESTON, *Chairman*.
W. METCALF.
A. P. BOLLER.
THOMAS C. CLARKE.
F. COLLINGWOOD.

The great and pressing importance of resuming the investigation begun nine years ago, into the strength of metallic structures, the parts and materials of which they are composed, can hardly be overstated. While, perhaps, it is best realized by members of the engineering profession, every consideration of public safety, of corporate and private economy demands that we should increase our knowledge of modern structural materials.

This can in no way be so well done as by a commission of experts (both civil and military), which shall avail of the Government machine to carry on the necessary experiments, and to generalize from these, and from the results of the many thousands of private experiments of which it can obtain the records, the general laws which should govern in the framing of specifications and the designing of structures.

Success will largely depend upon the character of the commission, and especially upon the engineer who may be selected by it to perform the actual work of carrying on the tests, and of deducing general conclusions from them. In order, therefore, to secure the best results, the necessary legislation will need to be carefully considered, and elaborated in connection with those of our members most competent to give sound advice on this subject.

The Board of Direction, therefore, recommends that it be authorized by the Society to memorialize the Congress of the United States, and to promote, so far as it can be done, without incurring expense, the introduction and framing of a law adequate for the intended purpose.

On motion, the report was received. Mr. Lyman Bridges moved that the report be adopted, which motion was seconded.

The Chair, Mr. Ashbel Welch : Discussion is now in order.

Gen. WILLIAM SOOY SMITH.—I wish to take this opportunity to express my great gratification that the recommendations of the Committee should be so precisely in accordance with what has already been done toward securing the accomplishment of this great work. The report sounds to me like "a twice told tale."

There is scarcely a recommendation it contains which has not been acted upon and carried out by the Committee that preceded this one. The original bill passed by Congress provided for the appointment of a similar Board, except as to the number of its members.

That was a mixed Board, consisting of several civil engineers and of officers of the Army and Navy. The bill went further, and provided that the Board should go on and *make* tests; not that it should *superintend* them. The idea that these tests can be made by certain persons and *superintended* by certain other persons who shall make a report upon them and present it to the country as their work, is, I think, altogether wrong. The work should not be done by proxy; but it should be done by competent men, who, watching the experiments as they are performed, may gather the best lessons they teach. I do not suppose there is an engineer present, who has made experiments, who does not know that the most valuable suggestions they afford, are often developed and caught by the quick eye of an experienced observer while the test is in progress. The mere manual labor, the handling of the samples, and the machinery employed, will, of course, be done by mechanics trained to this work. But the experiments must be watched, the results observed, and deductions made by engineers specially fitted for such duty by natural aptness, thorough education and large experience. All the facts revealed will then be noted, correctly arranged, and conclusions logically drawn from them.

This is the kind of investigation that turns out to the advantage of the world. Such labor should be well paid for, and it is unworthy of a great Government like ours to accept such services for nothing. It is only by years of patient, faithful work, performed by the ablest engineers in this country that the knowledge we so much need can be acquired. And to expect a Board to do it at arm's length, leaving the burden of it to be performed by a single individual, is, I think, to commit a great error, and one fatal to the value of the work and to the confidence it should command. Is there one of us here present who feels competent to undertake this great investigation and to carry it through alone, even though aided by an able Board at a distance?

This Government ought to see that this great work is done, on which the welfare and lives of its people depend in such large measure. And it should pay for it.

It is easier to get the Government to undertake it again, and easier to get the necessary appropriations from Congress to have the work well done and decently paid for, than to inaugurate and carry through a less thorough and reliable set of investigations. The representatives of the Government will say, bring before us a well digested measure, which will secure such thorough accomplishment of the work proposed that the positive knowledge you require will be sure to be obtained, and all doubts removed on vital questions touching the strength and characteris-

tics of iron and steel, and we will vote for it. We desire to feel that when the work is done, it will be well done.

That was the view presented to the Government before.

Some of the gentlemen here present accompanied your former Committee to lay this matter before the Committee on Appropriations of the U. S House of Representatives. In the beginning we were notified that we would be given fifteen minutes in which to explain the matter. The Representatives soon became so interested that the limitation of time was removed, and the result was a conference lasting nearly half a day, and an appropriation of seventy-five thousand dollars with which to build a testing machine and to begin the tests. Congress was then advised that this would only suffice to begin the work, and that it would be asked for appropriations, from time to time, as means might be required to carry it on.

With the money so appropriated the machine was built. You know of the delays that occurred. These were unavoidable, and thoroughly compensated for by the excellence of the testing machine when completed. It is beyond question the most perfect one ever built, and it could not have been so well done in less time.

The Board labored earnestly. The machine was built, a comprehensive mapping out of the experiments and investigations proposed was made, and the work fairly commenced.

You were advised, from time to time, of the hostile influence that worked to destroy the Board. There was but one apparently, and this was revealed to you from year to year.

At the end of eight years of labor that was performed gratuitously by your former Committee, whose members were willing, nay, glad to contribute this much to the cause of science, and so to the general good, you discharged that Committee, with thanks, to be sure, and appointed this one as a sort of Investigating Committee, and it has gone over exactly the same ground in the way of inquiry and recommendation.

I do not wish to take exception to its report. I desire harmonious action on the part of this Society, and will contribute all I can to such action.

I am glad the members of this Committee have reached conclusions so precisely in accord with those which governed the action of the Committee that preceded this one. I have profound respect for their views, and those of the Society.

I hope there will be no division of opinion amongst us on this very important subject. We want success and we must be willing to work hard for it; but let us do it rightly, and let us not sacrifice the valuable features of our plans for getting the knowledge we must have through a mistaken notion that Congress will not appropriate enough money to do this in the most perfect way.

Congress will make the necessary appropriations if all the members

of this Society will work to convince its members of the absolute necessity of the knowledge we seek.

The Supervising Architect once informed me that in his department alone, the Government consumed eight thousand tons of iron and steel in fifteen months. Enormous quantities of these materials, and of wood, brick and stone are purchased and used by the Government every year, and yet the rules and formulæ which govern the use of these materials are inaccurate, and in some instances actually misleading, as we all know.

This consideration alone should justify ample appropriations for such tests and experiments as will enable a Board to correct these rules and formulæ, and to place before our profession and the people all the knowledge we require to enable us and them to apply the materials used in construction wisely and economically.

There are two branches to this subject, as there are to most with which the civil engineer has to do, viz., the science of it and the art of it. There are new processes employed in the production of the metals, and many new forms in which they are used—the art progresses rapidly—the science lags behind—and we have not tested sufficiently these new products and shapes. These are constantly multiplying, and it will require industrious testing and experimenting to keep the science up with the art.

Each of us now has to make his own experiments, and the country derives little advantage from them. They are disconnected and desultory, designed generally to ascertain the strength of the parts of our structures, and not to establish any general laws for the government of others in the use of the materials used in construction.

The connected and complete investigation of the strength and qualities of these materials, and the deduction of right rules and formulæ from the results of such investigations is the work of the Government, and it is its imperative duty to perform it.

If we all work vigorously and together we can influence the Government to resume this work and complete it.

But we must not degrade this work by entrusting it to a *Superintending* Board, which is to let it out to be done by a single man, however able he may be.

One man can make a certain set of experiments best, another can best pursue another line of investigation, each working in the field of his own experience and strongest talent.

The Ordnance Department can make its experiments for the determination of those qualities which it requires in the metals for its uses. The Engineering Department will make other tests to gain the knowledge it requires. The Navy seeks still other knowledge, and the civil engineers, manufacturers and mechanics of the country, coming from the broad field of its civil industries, ardently desire such knowledge as

will enable them to make and use iron, steel and other materials wisely and well, under the varied requirements which they have to meet and satisfy. Let these all be represented in a Government Board which shall devote its whole time and best energies to the great work now under our consideration, and then and only then will it be well and thoroughly done.

Neither Faraday, nor Humphrey Davy, Newton nor Laplace, trusted their investigations to second hands, but made them themselves; and so all truly great and valuable searches for scientific truth are made.

I beg the indulgence of the Society for the earnestness with which I have endeavored to impart this view of the work of the testing Board, it is the result of years of thought on this subject, and I feel sure that it is correct. I have all respect for the opinions of the gentlemen who framed the report. I have simply felt it my duty to take issue with them on that point and one other.

The report recommends that the Board shall report to "the proper department."

We know now how that will end. The Board will be required to make the experiments under the direction of, and make its report to the Ordnance Department of the United States Army. This was attempted before. A letter of instruction came to us to that effect, and we had to go to Washington and get the letter recalled. It is not right that any department should exercise such control. It is not what is due to the officers of other branches of the Government service. It is not courteous to the civilian members of the Board. It is not consistent with the proper performance of the work, and it is not and never was graceful in any department of the Government to seek such authority over a Board created to be independent. No department of the United States Government has the necessary knowledge and skill to do this work, and none should be permitted to control it to its sad detriment. Why should we go to a department to get this great work done, requiring the widest range of engineering talent, skill and experience? We do not seek their aid when we design and build bridges, tunnels and railroads. The Board should be independent, and it should report directly to the President or to Congress, and not to any department. And in whatever may be done, it will be necessary to guard carefully against any instructions precedent which any department may propose to give.

I beg pardon once more for the manner in which I have presented these views, and reaffirm my great gratification with the report of the Committee as a whole.

I hope its recommendations may be carried out, with the exception of the two which I have endeavored to criticise, and these, I think, the Society will do well to have changed.

Mr. F. Collingwood—I do not wish to reply at length to what Gen. Smith has said, because I agree with him entirely. The only point I

wish to refer to is this: the Committee, I think, would have been very glad to have recommended exactly what he suggests as to a paid commission. They discussed that matter at considerable length, and I am sorry to say, they had a feeling that it would endanger the appointment of a commission. If it is thought by a larger number that a paid commission can be carried through, then I think the Committee would heartily recommend it.

Then, as to the other point, reporting to the proper department as to the work done, it was simply expected that if money was entrusted to the Committee to expend, it should report to the proper department what they had accomplished. I scarcely think that it can be made to mean that we were to go to the department for instructions.

Mr. W. Sooy Smith.—I wish to state again that I feel that I have good reasons to believe that there is no difficulty insurmountable in getting the necessary appropriations from the Government to make these experiments. The cause of our failure to get further appropriations before, I think, was stated to this Society. It was a lack of interest on the part of the members of our Society—and yet not all, because some did work hard. It was a lack of general interest, a lack of active interest. With a membership of over 600, scattered all over this country, we can reach every member of both Senate and House. It is a thing that is so manifestly right and necessary that there is no difficulty whatever in showing that the thing is right, and if we will take the trouble to speak to each member, it can be accomplished. Men will be paid by the Government, and they should be.

The compensation should be equal to that of any Government officer on the Board. There were only three civilians on the old Board. The clause providing pay for the civilian members was cut out, and I think for the purpose of driving them out of the Board. We should not make that mistake again; let us ask the Government to do this thing as it ought to be, and I think it can be more easily accomplished in that way than in any other. No one engineer can do that work as it ought to be done. I do not think any one present would feel competent to go over all the field, but that competency we can get by proper selections from the great body of engineers in the country; and in that way, it seems to me, it ought to be done.

Capt. O. E. Michaelis.—I only want to say a few words not only as a member of the Society, but also as a Government officer. There is one thing that should be remembered: Congress does not make appropriations and leave their disbursement to what it would consider irresponsible officers. They are disbursed under the Treasury Department or the War Department or some other department, and Congress holds the heads of those departments responsible for the expenditure of the money. Of course, special appropriations being made, and the heads of departments not being experts, they must confide the work to their

proper subordinates ; and while I listened with much interest to my gallant friend and cordially agree with him, still I take exception in one point. There is Government supervision in almost everything. Now, we have here in this Society probably the best bridge builders in the country. They know, however, that they cannot build a bridge over a navigable stream without submitting their plans to officers of the Government. The plans must be approved by those officers, and after that the bridge may be built. Such a course does not seem to be inconsistent with the respective rights and dignity of all concerned, and I feel certain that with proper provision as to expenditures, the officers of the Army and Navy would accept any programme proposed. Of course, I, as an ordnance officer, would prefer that my department had that supervision. Still, there must be that supervision. The President, however, is primarily responsible. He transfers it to the Cabinet officers, and they to some one subordinate to themselves. Some one man is held responsible for certain money. That is the principle that runs throughout our Government.

Mr. Lyman Bridges.—The Ordnance Department has certainly made many tests for their special requirements. There are, however, in the Engineer Corps of the Army many able officers, and if this work is to be referred to any other department, it seems to me it should be to the Engineer Bureau of the Army.

Mr. Theodore Cooper.—Before the discussion goes any further in this direction, permit me to say, that as Civil Engineers we have no objection to any department of the Government doing any portion of this work which properly lies within their field of experience. But the whole field of investigation is too wide to be put in charge of any department, whose proper duties are confined within comparatively narrow limits. Our aim is not solely to know the strength of iron, steel or bronze, for the making of ordnance, but for the innumerable applications of these metals for constructive purposes in the arts and sciences. A field we claim to be almost exclusively in the hands of our civilian engineers, constructors and manufacturers, and which is but slightly within the experience of any single department of the Government. We desire this work put into the hands of men whose past experience is such as to enable them to start from the plane of our present knowledge, and as to lead them to a full and comprehensive examination of this subject. To use our time and money to the best advantage, we think, such men, acknowledged as our present experts in the past knowledge of these metals are the proper ones to direct the advance upon the strongholds of our ignorance in regard to their full properties.

Mr. William Metcalf.—I would like to say a few words on points that seem to me vital. In regard to the departments, I agree entirely with the gentleman from the Ordnance Department. It is simply absurd for this or any society of irresponsible people to ask the Government

to make appropriations of large sums of money that we shall not account for. It is no matter to us what department we report through, but unlesss Congressmen can feel that they will get reports through officers that are responsible, we need not hope for any appropriations at all. The second point is in regard to the question of supervision by the Department. It was the intention of the Committee to provide that this body of experts should direct and control the character of the work to be done, and lay it out fully for the employees of the Commission; and they also provided that this Commission should have charge of the direction of the publication of these reports. Thus the preliminary reports to submit to the Society and to all experts, and the final reports would be so distributed that they would go where they could do the most good. I would like to know how the gentleman expects this Society to retain an interest in a work year after year, except they get reports. There is a great deal of difficulty in getting the first reports, though there were enough published to have gone into the hands of every member. They are lying in the bar-rooms and grog shops, and engineers cannot get them. Further, what is everybody's business is nobody's business. If it is left to five or six hundred members of the Society, that work will never be carried on; but if there is a commission properly organized, of the right kind of men, then this Society and all other scientific bodies throughout the country will see that it has their moral and active support; everybody will aid in carrying on their work, and there will be little difficulty in getting the necessary appropriation. As to the third point in carrying out this work, I doubt if you can select from this Society, to make these experiments, any commission which would do as well as one man—a man who is a thoroughly educated engineer, and who, after six months' practice on that machine, could do everything that this Commision should require him to do, having nothing to see to except the doing of the actual work. Some man must do that, and he must be an expert. In my experience, I have never yet seen an engineer in Pittsburg interfere in any way. Inspection is about the first work that an engineer is set to do. I know in my own case, when I first started in business, I was put in charge of the testing of gun iron, under Major Wade and Major Rodman, and in a few months the whole matter was put in my hands. I spent months in Watertown, and neither General Rodman nor Major Wade ever thought of coming near the machine. They depended upon me, and took the figures and reports and used them; and that is exactly what any commission will have to do if they want to get good, thorough work. They will have to employ competent clerks, and then you must select the very best and ablest men to superintend and lay out and plan. Then you can get the work well done, and I do not believe you can get it done satisfactorily in any other way. These are the considerations which led us to develop those three points in the report, not in any sense criticising the old Commission, and

only hoping to secure the entire confidence of the Government, so that there would be no difficulty, from year to year, in obtaining all necessary appropriations. In regard to the officers of the army, I never, so far as I had any experience with them or knowledge of them, saw an officer who was not always ready to do all he could to aid such work, and ever glad to get all the results he could, and who would not turn in and do all he could to help on with the work, and especially if he were an expert in his business.

Mr. Wm. Sooy Smith.—I approve fully the suggestion of the expenditures being under the supervision of the Governmental departments. There never was any objection made. Upon that point I presume we are all agreed. I also agree fully with the last Committee as to the method of making reports. I think it is a very wise idea and a good one.

As to the third point, I return to the original ground. I do not think any single man should be entrusted with the direct supervision of the work. I think we have proven the worthlessness of the knowledge obtained in that way upon which we have relied heretofore. We are told that competent engineers would not attend to these experiments, and that novices, when they commence work, are put in charge of these experiments. We know that is true. We don't want that done in this case. We want an expert in each line of investigation. I do not think that there is or can be any doubt on this question in the minds of those who have given the subject earnest consideration. If these experts are paid as they should be, they can devote their whole time to it, and we will have the work thoroughly done. I know the investigations are made in the old world in this way. In Berlin I saw Spangenberg in his shirt-sleeves in his great workshop, and he was not trusting to assistants to make the experiments in which he is specially interested. It is in that way that the best lessons can be learned.

On the other two points I thoroughly agree with the Committee's recommendations.

Another consideration I wish to present, and that is the impropriety of requiring a Board not only of civil engineers, but made up of officers in different branches and corps of the Government service, to be under direction of a single Government department. It is not proper that the Board should be subject to such direction, and in the old Board general objection to that was made. No more harmonious Board could be organized than the old one was. There were honest differences of opinion, such as exist everywhere amongst thinking men, but they were amicable.

We should urge that this Board should be independent, and that no Government department should prescribe the tests to be made nor the manner of making them.

The following resolution was offered by Gen. Wm. Sooy Smith:

Resolved, That the report be received, and that the Board of Direction

be authorized to memorialize Congress, and to promote, so far as it can be done without incurring expense, the introduction and framing of a law adequate to resume the investigation into the strength of structures, and the parts and materials of which they are composed.

This resolution was seconded, and accepted by Mr. Bridges as a substitute for that offered by him.

The resolution was then adopted.

Mr. William Metcalf.—Before proceeding to other business, I would like to say, in behalf of the American Institute of Mining Engineers, that that Institute will meet in Washington on February 21st, 1882, and the following days. That Institute has arranged to give to this subject one whole session of its meetings, and has provided for a discussion by members especially qualified to speak thereon. If the Board of Direction of this Society can have the memorial to Congress prepared before that time, I am sure the members of the Institute of Mining Engineers will make every effort to promote a proper disposition of the matter.

The following resolution was offered by Mr. O. Chanute; seconded and adopted:

Whereas, Mr. T. F. Rowland has subscribed $2,500 to the Building Fund, and this subscription, much the largest thus far made by any one member, should be specially acknowledged by this Society; therefore,

Resolved, That the thanks of the American Society of Civil Engineers be tendered to Mr. Rowland for his generous subscription, and that he be presented with a copy of these resolutions.

Resolved, That the Board of Direction be instructed to make the necessary arrangements to institute an annual prize, of the value of at least $50, to be known as the "Rowland Prize," and to be regularly awarded hereafter, to the authors of papers read before the Society, under rules to be jointly framed by Mr. Rowland and the Board of Direction.

A member who was not present at the morning session requested information as to the action taken in reference to compounding annual dues or creating Life Memberships. This information being given, a motion was made and carried reconsidering the action taken at the morning session in reference to the proposed amendment to Article XXII of the Constitution, so as to allow further discussion.

Mr. Lyman Bridges.—In reading a report recently issued from the Finance Committee, I was surprised to find that they did not see that compounding dues or creating Life Memberships would inure to the benefit of this Society. It seems to me they ought to have reported a proper sum for this purpose. Other similar societies have Life Memberships, and certainly a sum can be found which will be fair and advan-

tageous to all. If $300 is not enough, then some other sum must be enough. Interest certainly accumulates, and if five per cent. cannot be depended upon, then take a lower rate. It does seem to me a mistake to have the action of this Annual Meeting go out as discountenancing the idea of Life Memberships. I would like to become a Life Member at whatever price may be determined upon by the Finance Committee as fair, and I am inclined to move that it be the sense of this meeting that an amount of $500, or such an amount not exceeding $500 as the Finance Committee deem fair, should be the sum at which annual dues may be compounded by one payment.

The Secretary, Mr. JOHN BOGART.—I am afraid that the report to which the gentleman alludes, was so long that he did not quite read through the whole of it. The report was made under these circumstances: An amendment to the Constitution was regularly offered, fixing the future rate for compounding annual dues at a definite stated amount. Neither the Board of Direction nor the Finance Committee had any right to alter that amount, or to in any way change the proposed amendment. But, as the Board considered the subject of the greatest importance, it requested the Finance Committee to look into it, in its bearings upon the finances of the Society. The Finance Committee did so, and prepared a report, which the Board issued simply for the information of the members of the Society. That report showed that, in the judgment of the Committee, the affairs of the Society were in such a condition that it would be unwise to recommend a basis for compounding dues which would tend seriously to lessen the present annual income; that the amounts which, under present circumstances, it would be safe to adopt would appear large, and the Committee feared might tend to discourage members from compounding. The Committee added: "While we look with favor upon the plan of compounding dues as having for its object the permanent and best interests of this Society, and which, if in successful operation, would in time accomplish all that might be expected of it, yet we fear that its introduction at the present time might so seriously embarrass the Society financially as to jeopardize those important interests which this plan was especially designed to subserve."

The Committee, as the gentleman states, did not fix a rate for compounding dues. It really was not their duty to do so, because only the Society, at the Annual Meeting, has the right to change or amend a regularly proposed amendment to the Constitution. This, I think, explains the point made as to the report referred to. I may add, that I feel sure, in view of the discussion of to-day and of the consideration that will certainly now be given to the subject, that a plan will soon be elaborated which will successfully accomplish the desired result, and which will give a method of compounding dues alike just to the individual member and to the Society at large. With this expectation, I suppose that it will be the better course to recommend that the present proposed

amendment be not passed. For myself, I will say that the subject impresses me as so important that I will endeavor to aid, as far as I can, in its suitable and speedy solution.

NOTE.—By an error in transcribing, the statement of the funds and income of the English Institution of Civil Engineers was incorrectly given in the Proceedings of this Society, October, 1881, Vol. VII., p. 108.

The statement for December 1, 1881, is :

Institution Investments	£36 838
Trust Funds	14 642
Total	£51 480
Or, say	$257 400

The total receipts for the year were :

Strict income, including dues, interest on Institution Investments, etc.	£12 398
Other receipts, including admission fees, and life compositions, which are treated as capital, also interest on Trust Funds	3 508
Total	£15 906
Or, say	$79 530

Mr. LYMAN BRIDGES.—Not having been present this morning, I have, with several other members, asked for this information. In response to the circulars requesting contributions to our Building Fund, I have desired to do something, but I also desired to pay for a Life Membership, and had hoped the two might be combined. It seem that it ought to be possible to do so, or, at all events, to fix a sum, the payment of which would relieve any member so desiring of future annual dues.

Mr. Charles H. Fisher, moved to amend the proposed amendment to the Constitution by striking out $300, and inserting $500; and striking out $150, and inserting $300; and said that if invested at 5 per cent. these amounts would give to the Society the same annual income as the present dues.

Mr. JOSEPH P. DAVIS.—I doubt whether we should adopt this motion. If we find afterward that we can afford lower rates, it would be a mistake to recommend these. I think it is better that we should pass the motion we have reconsidered.

Mr. WM. P. SHINN.—The last article of the Constitution of the Society, which provides that proposed amendments shall be in order for discussion and amendment at the Annual Meeting, and with such amendments thereto as may have been approved by a majority vote of the Annual

Meeting, shall be voted upon by letter ballot, has been construed by the Board of Direction to provide that both the original proposition and also the proposition as amended at the Annual Meeting should be sent to letter ballot. I do not agree with that construction of the article, but it has been so decided. The result, in the present case, might be such a division of the vote as would prevent either proposition from being adopted. But since the non-resident members are not now very largely present, they might not understand how decidedly this Annual Meeting feels that the proposition, in its original form, should not at present be adopted. Should both the original amendment and this proposed modification of it go to ballot, many members might not be as likely to recognize the fact that the discussions here have determined in the minds of those present that the original amendment is not in a shape to be now adopted with advantage to the Society, and they might, therefore, vote for it, and the Society thus be bound to a provision not now desirable.

If we simply recommend that the original proposed amendment be not adopted, it will probably be more effective, and the subject can be taken up and put into proper shape at some future meeting.

In reference to subscriptions to the Building Fund, it must be remembered that amounts paid for compounding dues will not go to the Building Fund at all, but to the General Fund of the Society, the interest from which is used to defray current expenses. We have already discussed the propriety of passing a resolution to the effect that a subscription of a certain amount to the Building Fund should constitute the subscriber a Life Member. But we have decided that we could not do this, and the proposition that this meeting should recommend such action was not agreed to, because members present thought it inexpedient as tending to effect a change in the fundamental law of the Society, without previous general notice to members.

Under all the circumstances, it seems to me that the action of this morning, in recommending that the proposed amendment be not adopted, is the most desirable.

Mr. Lyman Bridges.—Can not this meeting recommend that one proposition, when submitted to letter ballot, should be passed, and the other not passed? If this is done, I think it probable that the recommendation will be considered by members when they vote.

Mr. Charles H. Fisher.—I did not understand, when I offered this amendment changing the sums from $300 to $500, and from $150 to $300, that both the original proposition and its amended form, as perfected at this meeting, would go to letter ballot. If that is the case, I am inclined to withdraw my amendment.

Mr. William P. Shinn.—At the last Annual Meeting a precisely similar case occurred. There was an amendment offered as to the manner of electing members. The Annual Meeting amended that proposed

amendment. The ballot was sent out by the Board of Direction, providing for a vote on both the original and the amended proposition. The result in that case was a division of the vote, and neither proposition was adopted. The danger in the present case is, as I have said, that, if it seems to be a question between two propositions, members who do not look thoroughly into the subject may vote for the one which in the view of this meeting is undesirable, while if the single original proposition is sent out, with the positive recommendation of this meeting that it be not adopted, then it will, probably, not be adopted.

Mr. Lyman Bridges.—It seems a pity that we can not recommend to the Society, with a probability of the recommendation being followed, some scheme which will secure the result which everybody here thinks desirable. I hope the way will be found to do it now. If not, I hope that at the earliest possible time after this meeting such a scheme may be elaborated. I have none now to propose. I venture to suggest that perhaps this division of residents and non-residents should not be taken into account in a compounding plan, but that one proper sum may be adopted for all members. Again, the laws in relation to annuities and life insurance premiums have been so well studied that their application to our case ought not be very difficult. Again, it might be arranged that the payment of the amount of dues for a term of years—say, perhaps, twenty years—should constitute Life Membership. At all events, it is certainly important to do something, and I believe such measures as have been suggested will help increase both the Building and the General Fund.

Mr. John Bogart.—While an addition to the General Fund does not increase the Building Fund, yet the interest from the investment of the General Fund would go directly towards paying the interest on the mortgage now held upon our property; so that the result of a contribution to either fund would be substantially the same.

The amendment proposed by Mr. Charles H. Fisher was then lost. The original motion was then again voted upon, and carried, as follows:

That this Annual Meeting recommends to the Society that the above proposed amendment to Article XXII of the Constitution is injudicious in the present condition of the Society, and that it should not be adopted.

Mr. William P. Shinn.—The tone of the discussion at this meeting has clearly shown that the feeling is in favor of such action as would admit of a subscription by a member to the Building Fund effecting a final payment of annual dues and constituting a Life Membership, and I have no doubt that as soon as it can be legally done such action will be proposed, and it will probably be adopted.

Mr. F. Collingwood exhibited specimens of wires which had been tested, and explained the results of the tests.

After an announcement of the programme for the following day, the Annual Meeting adjourned.

The Members of the Society present at the Annual Meeting, were :

Julius W. Adams, T. H. Aldrich, Wm. M. Allaire, E. R. Andrews, W. H. Atwood, O. W. Barnes, George S. Baxter, Van Brunt Bergen, H. Bissell, H. D. Blunden, James P. Bogart, John Bogart, A. P. Boller, E. W. Bowditch, H. R. Bradbury, W. H. Bradley, Lyman Bridges, Chas. O. Brown, Thomas E. Brown, Jr., L L. Buck, W. D. Bullock, James A. Burden, Wm. H. Burr, O. Chanute, E. S. Chesbrough, H. Wadsworth Clarke, Thomas C. Clarke, Thomas M. Cleemann, F. Collingwood, A. G. Compton, Theodore Cooper, Martin Coryell, J. James R. Croes, Charles G. Darrach, Jos. P. Davis, E. A. Doane, E. B. Dorsey, George W. Dresser, Thomas Egleston, N. W. Ellis, S. Clarence Ellis, Theo. G. Ellis, Theo. N. Ely, Charles E. Emery, Charles A. Ferry, Albert Fink, Charles H. Fisher, Clark Fisher, Sandford Fleming, M. N. Forney, Chas. E. Fowler, George H. Frost, E. E. Glaskin, Charles E. Goad, Bryant Godwin, Wm. H. Grant, S. M. Gray, D. M. Greene, George S. Greene, Jr., A. R. Haddock, S. S. Haight, Wm. G. Hamilton, Geo. E. Harding, Henrique Harris, B. D. Hasell, C. H. Haswell, W. A. Haven, A. B. Hill, Wm. R. Hutton, Walter Katté, Charles Kellogg, E. D. Leavitt, Jr., G. Leverich, Charles Macdonald, Arthur Macy, C. C. Martin, C. S. Maurice, James McCrea, T. H. McKenzie, George W. McNulty, Wm. Metcalf, O. E. Michaelis, H. S. Munroe, George S. Morison, Henry G. Morse, Isaac Newton, James Owen, Charles Paine, Wm. H. Paine, F. C. Prindle, Chas. Ward Raymond, David Reeves, J. Gardner Sanderson, Wm. H. Searles, Wm. P. Shinn, S. H. Shreve, W. W. C. Sites, C. Vandervoort Smith, Wm. Sooy Smith, R. P. Staats, Cook Talcott, Joseph R. Thomas, R. H. Thurston, M. M. Tidd, Robert Van Buren, E. B. Van Winkle, C. C. Waite, Henry F. Walling, C. D. Ward, L. B. Ward, Ashbel Welch, Thomas J. Whitman, F. M. Wilder, W. H. Wiley, John A. Wilson, Jos. M. Wilson, W. W. Wilson, S. Wimmer, De Volson Wood, and William E. Worthen.

The Members of the Society on Thursday morning met as arranged in the programme given below, which was carried out in all details.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

ANNUAL MEETING OF 1882.

JOHN BOGART, GEORGE W. DRESSER,
WILLIAM H. PAINE, C. VANDERVOORT SMITH,
CHARLES E. EMERY,

Committee.

PROGRAMME.

WEDNESDAY, JANUARY 18, 1882.

The Annual Meeting will be held at the House of the Society, beginning at 10 A. M.

The Annual Reports will be presented; officers of the Society elected; proposed amendments to the Constitution discussed. Reports are expected from the Standing Committees on Gauging of Streams, on Tests of Cements, and on preservation of Timber; also a report from the Board of Direction on the subject of Tests of American Iron, Steel and other metals. These reports will be discussed. General business will be transacted.

Lunch will be served at the House of the Society at 1 P. M. After lunch the session of the meeting will be resumed at 2:30 P. M. An evening session will also be held if found desirable.

THURSDAY, JANUARY 19, 1882.

Meet at Works of Manhattan Gas Company, cor. 18th Street and 10th Ave., at 10 A. M. (Members who prefer can meet at the Society House, at 9:30, and proceed thence to the Manhattan Works). Opportunity will be given for inspecting the whole of the works, if desired, and especially the practical working of the Ross Steam Stoking Machinery, together with arrangements for the economical handling of coal.

Thence proceed by boat to the Works of the Hudson River Tunnel, at Hoboken. The plans and practical operations connected with the Tunnel will be exhibited and explained.

Thence by boat, to the Station of the Pennsylvania Railroad at Jersey City, where its terminal arrangements will be examined.

Thence, also by boat, to the Brooklyn Pier of the New York and Brooklyn Bridge. The bridge will be crossed upon the main floor, which will be planked. This will be the first party to cross upon the main roadway.

From the New York terminus of the Bridge, proceed to the foot of Courtlandt Street, and visit the works of the New York Steam Heating Company, near the corner of Courtlandt and Greenwich Streets.

Thence, by boat, to the foot of 23d Street, North River, to inspect the work in progress at that point by the Department of Docks.

In the evening a Reception will be held at the House of the Society at 8 P. M., after which Supper will be served in the Library.

APPROXIMATE TIME TABLE.

JANUARY 18TH.

AT SOCIETY HOUSE.

10 A. M., Business Meeting.
1 P. M., Lunch.
2:30 P. M., Adjourned Meeting.
8 P. M., Evening Session (if held).

JANUARY 19TH.

10 A. M., Manhattan Gas Works.
10:45 " Leave " " "
11 " Arrive Hudson River Tunnel.
11:45 " Leave " " "
12 M., Arrive Pennsylvania R. R. Station.
12:30 P. M. Leave " " "
1 P. M. Arrive Brooklyn Bridge.
2 " Leave " "
2:30 " Arrive Courtlandt St.
3:15 " Leave " "
3:45 " Arrive Foot West 23d Street.
8:00 " Reception at Society House.

Much gratification was expressed with the arrangements, and with the fact that the Lunch on the day of the meeting, and the Reception and Supper on the evening of the second day, were held at the New House of the Society, which afforded accommodations for the enjoyment of a remarkably pleasant evening.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—February and March, 1882.

MINUTES OF MEETINGS

(Abstract of such as may be of general interest to members.

OF THE SOCIETY.

FEBRUARY 1ST, 1882.—The Society met at 8 P. M., Mr. Charles Macdonald in the Chair. Ballots were canvassed and the following candidates declared elected as members: Enrique Budge, Valparaiso, Chili; Chester B. Davis, Omaha, Nebraska; Robert Gordon, Henzada, British Burmah; George S. Rice, Charleston, Arizona; Thomas J. Seely, Las Vegas, New Mexico; Romeo Paul Tomassek, New York.

The deaths of the following named members were announced: Theodore Ransom Scowden, of Cleveland, Ohio, elected Member May 7, 1873, died December 31st, 1881; Moses Lane, of Milwaukee, Wisconsin, elected Member, December 4th, 1867, died January 25th, 1882; Alexander Lyman Holly, of Brooklyn, New York, Past Vice-President, elected Member, October 1st 1873, died January 29th, 1882,

FEBRUARY 15TH, 1882.—The Society met at 8 P. M., President Welch in the Chair. A paper by R. E. McMath, Member A. S. C. E., subject: "The Mean Velocity of Streams Flowing in Natural Channels," was read by Secretary Bogart, and discussed by Messrs. T. C. Clarke, Collingwood, Joseph P. Davis, Emery and Welch.

REPORT OF THE BOARD OF DIRECTION

For the Fourteen Months ending December 31st, 1881.

Presented and accepted at the Annual Meeting, January 18th, 1882.

The Board of Direction in presenting this Report for the fourteen months ending December 31st, 1881, desires to congratulate the Society upon this first annual meeting in a house of which it is itself the owner.

The purchase of this property is in the opinion of the Board a most important step in the progress of the Society. The great necessity of better provision for the accommodation of the different departments of Society work has been felt by many of our members for a number of years. The advance of the rent of the house in Twentieth Street, occupied since May, 1877, rendered it necessary either to rent new quarters, or to purchase a suitable house. The circular inviting subscriptions to a fund for the purchase of a house was issued January 1st, 1881. Details of the progress of the subscription, and of the purchase of this house are given in the following portion of this report. Before doing this the Board desires, in behalf of the Society, to acknowledge the promptness and liberality which has characterized the action of those who have subscribed to this fund. The number of paid subscriptions, up to January 1st, 1881, is 110; the amount paid to that date is $14,012. Among the subscriptions are three of $200, two of $250, three of $500, and one of $2,500. The spirit which prompted this last-mentioned subscription from an engineer who has been a member of the Society many years is thoroughly appreciated by the Board, and doubtless also by all the members of the Society.

Of the 110 subscriptions 77 have been made by Members or Fellows of the Society, and 33 by non-members. Of the 77 subscriptions made by members, 22 have been from resident, and 55 from non-resident members. Of the 33 subscriptions made by non-members, 4 have been from residents of New York and its vicinity, and 29 from persons residing beyond the bounds defining resident membership.

The annual charge to the Society for interest on the mortgage upon the premises, and for taxes, is now about the same amount as has been paid for the rental of the premises occupied for a number of years. This annual payment can of course be substantially reduced by an increase of the Building Fund, and thereby a reduction of the mortgage interest. When this shall be accomplished the revenue of the Society can be appropriated more fully to its general uses, and the publications can be substantially enlarged. The Board therefore renews in this report the appeal heretofore made by circular letters, and earnestly impresses upon the members of the Society, the great and important desirability of an increase of this fund. There are now 657 persons who are members of one or another class in the Society, 580 of whom have not subscribed to this fund. Of course there are a number among these who may not feel willing or able to do this, but there are also a large number whose lack of action is believed to be the result of inattention to the subject. Could the fund be largely increased within a short time by the action of these members, it is the emphatic opinion of the Board that the result would be of paramount advantage to the Society.

The property which is now owned by it is valuable, and is worth more now than when purchased by the Society.

By an amendment to the Constitution, adopted in February last, the termination of the Society year has been changed from the first Wednesday in November to the thirty-first day of December of each year. This report, therefore, covers the period of fourteen months, from November 3d, 1880, to December 31st, 1881.

On November 3d, 1880, the membership in the Society was:

Honorary members, resident....	3	Non-resident....	9	Total...	12
Corresponding members.....		"	3	" ...	3
Members, resident.....114		" 359		" 473	
Associates, "	6	"	14	" 20	
Juniors, "	6	"	42	" 48	
	—		—		—541
Making, resident.....129		Non-resident....427			—
Total.....					556

Fellows 66 of whom, 10 members, and 1 honorary member are included above, leaving..... 55

Total connected with the Society, November 3, 1880.....611

At the present time the membership is:

Honorary members, resident, 3		Non-resident.... 8		Total....	11
Corresponding members...		"	3	"	3
Members resident.....119		" 394		" 513	
Associates, "	9	"	15	"	24
Juniors, "	8	"	46	"	54
	—		—		— 591
Making, resident.....139		Non-resident....466			—
Total.....					605

Fellows, 63 of whom 10 members and 1 honorary member are included above, leaving..... 52

Total connected with the Society January 1, 1882..... 657

The additions during the past year to the several classes of Society membership have been:

Members qualified.....	45
Former members restored.....	2
Associates qualified.....	4
Juniors qualified.....	11
Total additions to the several classes of membership.....	62

The decrease during the year in the several classes of membership has been :

Honorary members.	Died, 1			1
Members	Died, 5.	Resigned. 2		7
Juniors	Died, 0.	Resigned. 2	Transferred to member 3	5
Fellows	Died, 3			3
Totals	Deaths, 9	Resignations. 4	Transfers 3	16

There has thus been an addition of 62 to the various classes of membership, and a loss by deaths, resignations and transfers of 16, making the actual net additions during the year 46 in number.

On November, 3, 1880, there were, as stated in the last Annual Report, 40 proposals pending ; 76 proposals have been received during the year ; 48 candidates have been elected Members, of whom 3 were transferred from Juniors, 4 candidates have been elected Associates; 11 candidates have been elected Juniors.

45 persons have, during the year, qualified as Members ; 4 have qualified as Associates ; 11 have qualified as Juniors ; 3 candidates elected during the year as Members have not yet qualified ; there are 15 proposals now pending.

Twenty-six meetings of the Society were held during the year, one of which was the Thirteenth Annual Convention, all the sessions of the Convention, including the business meeting, being counted as one meeting of the Society. Meetings have been held on the first and third Wednesdays of each month, except that there were no meetings in August, and but one in July.

Twenty meetings of the Board of Direction have been held during the year.

One of the meetings of the Society was held at Chickering Hall, in March, 1881, when Lt. Commander Gorringe, U. S. N., presented an illustrated paper upon the removal of the Obelisk from its site in Alexandria, Egypt, to its present site in the Central Park, New York City. This interesting paper was the first public presentation by Commander Gorringe of the engineering features connected with his successful undertaking.

The Annual Convention of the past year was held at Montreal, Canada, June 15, 18, 1881, and was attended by one hundred of our members. In addition to the time spent at that city, visits to Niagara Falls, to Toronto, to Ottawa and to Quebec, were included in the arrangements, and at each of those points, as well as at Montreal, opportunities were afforded for the examination of matters of special interest to engineers.

The constant increase of interest in the Conventions has been largely augmented by this, the first one held beyond the limits of the United States. The Board of Direction desires to record its acknowledgment of the obligation of the Society to its members in Canada, and to those who assisted them in perfecting the admirable arrangements made on that occasion.

The Board desires also to call the attention of all members of the Society who have not attended its recent Conventions to the fact, that opportunities for the discussion of professional subjects, for the examination of public works, and for the extension of social acquaintance among engineers, are afforded in a remarkable manner at these Conventions. Their influence has been excellent in many directions, and they have been greatly enjoyed by all who have taken part in them.

It is hoped that the attendance upon them will be largely increased, and that special effort will be made by all our members to be present at them in the future.

The Library has been increased during the year by the following additions :

Number of books bound	97
" " " unbound	118
" " pamphlets	654
" " maps and plans	27
" " photographs	16
" " drawings, specifications, models and specimens	93

These do not include magazines and papers contributed to the Society by publishers, or received in Exchange for the Transactions, a list of which is given in an appendix to this report.

The present state of the Library is about as follows :

Books and pamphlets	9,607
Manuscripts	116
Maps, plans, drawings, charts, photographs and engravings	2,157
Models and specimens	258

The catalogue of and index to the Railroad Section of the Library has been published and issued during the past year. This index has been not only an aid to the examination of books in the Library, but also an indication of much that has been published in this branch of engineering, and thus has been useful in itself as a book of reference.

The Secretary has, under the direction of the Board, issued recently. the following circular.

AMERICAN SOCIETY OF CIVIL ENGINEERS,
127 East 23d Street, New York.

Dear Sir,—You will confer a favor by sorting over the pamphlets in your possession, and sending to the Society such of them, relating to Engineering topics, as you are willing to contribute.

We already have a large collection of railroad, city, canal, waterworks and other reports, which form one of the most valuable features of the Library, and we desire to make it more complete by preserving as full a history as possible of the progress of our public works.

We also desire copies of testimony taken in patent cases; controversies concerning bridges, railroad crossings, reports of committees of investigation and of legislative commissions, &c., &c.

We also desire a copy of all new reports issued by your company.

All contributions will be duly acknowledged in the Transactions of the Society.

By order of the Board of Direction,
JOHN BOGART, *Secretary.*

The Board desires to impress upon the Members of the Society the great value of any contributions to the Library.

During the year demands for Engineers to take charge of various works, have far exceeded the number of members of this Society recorded with the Secretary as open to new engagements. Members who are in want of employment, or who contemplate changing their connection, are urged to send a record of their names, qualifications and expectations to the Secretary.

The Norman medal is thus far the only prize which the Society can annually offer for excellence in the papers presented at its meetings. It is desirable that a larger number of prizes shall be at the disposal of the Society, as an incentive to have papers carefully prepared, and to draw them out in adequate numbers. It is, therefore, suggested that members who can afford it, or who know persons of means, interested in particular subjects, shall promote the establishment of funds for the annual awarding of additional prizes, under such conditions as the donors shall specify and the Board of Direction accept.

Reports made during the year have been as follows:

By the Board of Direction: The Annual Report for the year.

By the Finance Committee: 2 Reports.

By the Treasurer: His Annual Report and frequent statements to the Board.

By the Secretary: Monthly Reports to the Board.

By the Committee on Tests of American Iron, Steel and other Metals: 1 Report.

By the Committee on Gauging of Streams: 2 Reports.

By the Committee on Uniform System of Tests of Cement: 1 Report.

By the Committee on Preservation of Timber: 1 Report.

The Treasurer's Report and the Report of the Finance Committee will be submitted at this meeting.

By the Committee on Engagement of Civil Engineers upon Government Works : 1 Report, and the Committee discharged.

By the Nominating Committee : 1 Report.

By the Committee on Award of Norman Medal : 1 Report.

Reports will be expected at this meeting from the Board of Direction on Tests of American Iron, Steel and other Metals ; from the Committees on Gauging of Streams ; on a Uniform System of Tests of Cement ; on the Preservation of Timber ; on Uniform Standard Time, and on the Award of Norman Medal.

The Transactions and Proceedings have been regularly issued during the past year. The Board reiterates the appeal to Members of the Society, so often heretofore made in the Annual Reports and elsewhere, to contribute to these Transactions papers or memoranda from the rich field of engineering experience now enlarging rapidly. It is only by the active and constant assistance of the members of the Society that the efforts of the Management and the Editor of the Transactions can result in a proper presentation of this essential element in the Society work.

The proposed Amendments to the Constitution, which have been presented since the last Annual Meeting, have been printed and distributed to members, and will be submitted for discussion at this meeting.

The Society has lost by death, during the term covered by this report, one Honorary Member, Baron Max Maria Von Weber; five members, Messrs. Henry Cartwright, G. Thomas Hall, James H. Reno, W. Milnor Roberts and Henry R. Worthington, and three Fellows, Messrs. A. D. Briggs, Wm. G. Fargo and Andrew Kloman. Appropriate memoirs of these deceased members have been, or will be, published in the Proceedings. The Board, however, desires to especially express in this Report its sense of the great loss the Society and the profession have sustained in the death of Col. W. Milnor Roberts, Past President A. S. C. E. Col. Roberts became a member of the Society September 21, 1870. He was elected Vice-President in November, 1873, and continued either as Director or Vice-President till November, 1878, when he was elected President of the Society, which office he held when he left this country to engage in professional service in Brazil. He was also the Treasurer and an active member of the Centennial Commission of the Society. In the exercise of the trusts and duties confided to him in these positions he was always earnest and faithful, and devoted for many years a large share of his thought and action to the welfare of the Society. He was one of the most constant attendants at the meetings of the Board and the Committees, and his associates take this occasion to record their recognition of the value of these services.

Respectfully submitted.

JOHN BOGART,
Secretary.

REPORT OF THE TREASURER

For Fourteen Months ending December 31st, 1881.

Note.—[The change in the date for the termination of the Society year makes it necessary to include fourteen months in the present statement.]

Presented at the Annual Meeting January 18th, 1882.

Receipts.

Balance on hand November 3d, 1880		$3,168 39
Entrance fees		1,600 00
Current Dues—*For the 12 months ending November 3, 1880:*		
From 76 Resident Members	$1,789 75	
" 260 Non-resident Members	3,703 72	
" 5 Resident Associates	60 00	
" 10 Non-resident Associates	95 00	
" 6 Resident Juniors	90 00	
" 30 Non-resident Juniors	285 00	
		6,023 47
" " *For November and December, 1881:*		
From 63 Resident Members	$262 10	
" 206 Non-resident Members	515 00	
" 3 Resident Associates	7 50	
" 6 Non-resident Associates	9 96	
" 5 Resident Juniors	12 50	
" 26 Non-resident Juniors	43 15	
		850 21
Past Dues—From 10 Resident Members	$260 00	
" 21 Non-resident Members	425 95	
" 1 Resident Junior	15 00	
" 2 Non-resident Juniors	20 00	
		720 95
Dues for year beginning January 1st, 1882:		
From 33 Resident Members	$825 00	
" 122 Non-resident Members	1,785 15	
" 2 Resident Associates	30 00	
" 3 Non-resident Associates	30 00	
" 2 Resident Juniors	30 00	
" 14 Non-resident Juniors	140 00	
		2,840 15

Sales of Publications		$787 48
Certificates of Membership		93 00
Advertisements		180 00
Miscellaneous		64 23
Interest on Fellowship Fund Bonds	$523 95	
" Savings Bank Deposit	38 92	
" Norman Medal Fund Bonds	105 00	
" Railroad Stock	82 80	
		750 67
Proceeeds of Sale of Fellowship Fund Bonds		8,880 00
Advance Subscription for Payment on Building		5,000 00
Subscriptions to Building Fund		13,987 00
		$44,945 55

DISBURSEMENTS.

Rent to May 1, 1881	$800 00
Interest on Mortgage	579 86
Taxes	576 40
Publications	3,602 60
Stationery and Printing	771 35
Postage	915 74
Library, including Index to Railroad Section	1,036 48
Salaries	3,500 00
Convention, Annual Meeting and Special Meeting	443 77
Janitor, House Supplies, Fuel, Furniture, Water and Gas	1,404 22
Certificates of Membership	85 20
Other expenditures	202 17
Insurance	62 59
Norman Medal	65 80
Moving to present House	284 63
Payment for U. S. Bonds for Fellowship Fund	9,129 37
Repayment of advance Subscription for payment on Building.	5,000 00
Payments on account new Society House	10,931 38
Transferred to Savings Bank Deposit	38 92
Balance on hand, Building Fund	3,055 62
Balance on hand, General Fund	2,459 45
	$44,945 55

The Funds of the Society are as follows:

Fellowship Fund:			
80 Subscriptions		$8,150 00	
Accumulated Interest, November 3, 1880		813 83	
Interest received, November 3, 1880, to December 31, 1881		562 87	
Premium received on sale of Jersey City Water Loan Bonds		880 00	
		$10,406 70	
Expended from fund, Nov. 3, 1880, to Dec. 31, 1881:			
For Premium on purchase of United States bonds	$129 37		
For Publications	274 58		
		403 95	
		$10,002 75	
The present investment of the Fellowship Fund is, at par value:			
9 United States Government Bonds		9,000 00	
Deposit in Seamens Bank for Savings		1,002 75	
			$10,002 75
Norman Medal Fund;			
1 Certificate Croton Aqueduct Stock, New York City			1,000 00
General Investment:			
10 Shares New York Central and Hudson River R. R. Stock		$1,000 00	
1 Consolidated Certificate New York Central and Hudson River R. R. Stock		35 00	
			1,035 00
Building Fund:			
Receipts Nov. 3, 1880, to Dec. 31, 1881		$13,987 00	
Previous to Nov. 3, 1881		25 00	
		$14,012 00	
Expended:			
For Legal Services, Circulars, etc.	$355 03		
For Betterments on Property	601 35		
Payments on Purchase	10,000 00		
		10,956 38	
On hand December 31, 1881		$3,055 62	

J. JAMES R. CROES,
Treasurer.

REPORT OF THE COMMITTEE ON FINANCE.

PRESENTED, READ AND ACCEPTED AT THE ANNUAL MEETING, JANUARY 18, 1882.

To the Board of Direction of the American Society of Civil Engineers:

The Committee on Finance have carefully examined the assets of the Society, and find them correctly reported by the Treasurer.

They would further report that they have audited all of the bills that have been paid during the past year, and find them to have been approved and endorsed by the proper officers, and in no case have the appropriations made by the Board been exceeded.

SOCIETY ROOMS, Jan'y 17, 1882.

W. H. PAINE,
C. V. SMITH,
JOS. P. DAVIS,
Committee on Finance.

CONTRIBUTIONS TO THE BUILDING FUND.

By a resolution of the Board of Direction, all contributions to the Bulding Fund are to be acknowledged, from time to time, by printing lists of the same in the monthly Proceedings of the Society, and in addition to this the names of all those who may subscribe $100 or more are to be regularly enrolled and published in future lists of the Society under the head of Subscribers to the Building Fund, and they will be entitled to receive one copy of the monthly publications, comprising all papers and transactions of the Society, regularly, for life, for each $100 subscribed by them; such copies to be in addition to those which they may be already entitled to if they are Members or Fellows:

The following contributions are acknowledged in addition to those heretofore noted:

A. P. Boller	$150 00
Boston Gas Light Company	250 00
John H. Drake	150 00
William R. Eckart	100 00
N. W. Ellis	25 00
C. L. Gates	20 00
Mrs. W. H. Greenwood	15 00
*S. S. Haight	10 00

*Additional subscription to payment previously acknowledged.

Sandford Horton	$100 00
John B. Jervis	100 00
E. C. Lewis	100 00
William Thaw	100 00

LIST OF PUBLICATIONS AND PAPERS RECEIVED FOR LIBRARY.

Appendix to Annual Report of Board of Direction, January 18, 1882.

The following papers are contributed to the Society, or are received in exchange for Transactions :

American Architect and Building News	Weekly	Boston.
American Engineer	"	Chicago.
American Gas Light Journal	Semi-Monthly	New York.
American Machinist	Weekly	"
Annales des Travaux Publics	Monthly	Paris.
Army and Navy Journal	Weekly	New York.
Builder	"	London.
Building and Engineering News	"	"
Bulletin American Iron and Steel Association	Semi-Monthly	Philadelphia.
Bulletin du Canal Interocéanique	" "	Paris.
Commissioner of Patents' Journal	Semi-Weekly	London.
Critic	" Monthly	New York.
Deutsche Bauzeitung	Weekly	Berlin.
Engineer	"	London.
Engineering (2 copies)	"	"
Engineering and Mining Journal	"	New York.
Engineering News	"	"
Genie Civil	"	Paris.
Iron	"	London.
Iron Age	"	New York.
Journal of Artillery and Military Engineering	Monthly	Vienna.
" of Society of Arts	Weekly	London.
" of Gas Lighting	"	"
Manufacturer and Builder	Monthly	New York.
Manufacturer and Iron World	Weekly	Pittsburgh.
Mechanics	"	New York.
National Car Builder	Monthly	"
Record of Scientific Literature	"	"
Railroad Gazette	Weekly	"
Railway Age	"	Chicago.
Railway Review	"	"
Railway World	"	Philadelphia.
Reportorium der Technischen Literatur		Leipsig.
Revue Générale des Chemins de fer	Monthly	Paris.
Sanitary Engineer	Weekly	New York.
Scientific American	"	"
Scientific American Supplement	"	"
Tehnic Tidskrift	Monthly	Stockholm.
Techniker	Semi-Monthly	New York.

Telegraph Journal and Electric Review	Semi-Monthly	London.
The Locomotive	Monthly	Hartford,
Van Nostrand's Magazine	"	New York.
Zeitschrift fur Baukunde	Quarterly	Munich.
Zeitschrift fur Bauwesens	"	Berlin.

The following are subscribed for :

American Bookseller	Semi-Monthly	New York.
American Catalogue	" "	"
American Library Journal	Monthly	"
Index	"	"
Bookseller	"	London.
Publishers' Weekly	Weekly	New York.
U. S. Official Postal Guide	Monthly	Boston.

The Society has received during the year, in exchange for the "Transactions," official publications of the following associations, in many instances for preceding years :

Aeronautical Society of Great Britain	London.
Academy of Sciences	Washington.
Akademie des Bauwesens	Berlin
American Chemical Society	New York.
American Gas Light Association	"
American Institute of Architects	"
American Institute of Mining Engineers	Easton.
American Iron and Steel Association	Philadelphia.
American Society of Mechanical Engineers	New York.
Annales de Construcciones Civiles y de Minas	Lima.
Annales des Ponts et Chausées	Paris.
Argentine Scientific Society	Buenos Ayres.
Association of Civil Engineers	Lisbon.
Austrian Society of Engineers and Architects (Two Publications)	Vienna.
Boston Public Library	Boston.
Boston Society of Civil Engineers	"
Civil Engineers' Club of Cleveland	Cleveland.
Die Administration der "Mittheilungen"	Vienna.
Engineers' Club of Philadelphia	Philadelphia.
Engineers' Club of St. Louis	St. Louis.
Engineer Department, U. S. A.	Washington.
Engineers' Society, Western Pennsylvania	Pittsburgh.
Essayons' Club, Corps of Engineers, U. S. A.	Willetts Point.
Franklin Institute Journal	Philadelphia.
Imperial School	Moscow.
Imperial Technic Society of Russia	St. Petersburg.
Imperial University	Tokio.
Institution of Civil Engineers	London.
" " of Ireland	Dublin.
" of Engineers and Shipbuilders of Scotland	Glasgow.
" of Mechanical Engineers	London.
Iron and Steel Institute	"
Massachusetts Institute of Technology	Boston.
McGill University, Department of Science	Montreal
Mechanics' Institute	San Francisco.
Midland Institute Mining, Civil and Mechanical Engineers	Barnsley, Eng.
Mining Institute of Scotland	Hamilton.

National Board of Health.....Washington.
New York Meteorological Observatory.....New York.
North of England Institute of Mining and Mechanical Engineers.....Newcastle.on-Tyne.
Pi Eta Scientific Society.....Troy.
Royal United Service Institution.....London.
School of Mines, Columbia College.....New York.
Smithsonian Institution.....Washington.
Society of Arts.....London.
Society of Civil Engineers.....Paris.
Society of Engineers.....London.
Society of Engineers and Architects of Hungary.....Budapest.
" " " of Saxony.....Dresden.
" " " .....Hanover.
Stevens Institute of Technology.....Hoboken.
Swedish Society of Engineers.....Stockholm.
Thayer Scientific School, Dartmouth College.....Hanover.
Thomasson Civil Engineering College, Indian Engineering.....Roorkee.
United States Coast Survey.....Washington.
" Light House Board..... "
" Naval Institute.....Annapolis.
" Naval Observatory.....Washington.
" Ordnance Department..... "
University of Michigan.....Ann Arbor.
Western Society of Engineers.....Chicago.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
ANDREWS, JOHN W.	Supt. Midland North Carolina Ry., Goldsboro, N. C.	Mar. 1, 1882.
BATES, ONWARD	Bridge Entrance, St. Louis, Mo.	Jan. 4, 1882.
BONNYN, WM. WINGFIELD	26 Hospital St, Montreal, Canada	" "
BURNET, GEORGE, JR.	Asst. Engineer I. B. & W. R. W. Extension, Indianapolis, Ind.	Mar. 1, 1882.
DAVIS, CHESTER B.	Chief Engineer Water Works, Omaha, Neb.	Feb. 1, 1882.
FELTON, SAMUEL M., JR.	Gen. Man. New York & New England R. R., Boston, Mass.	Jan. 4, 1882.
GREENE, CHARLES E.	University of Michigan, Ann Arbor, Mich.	" "
JAYCOX, THOMAS W.	City Engineer, P. O. Box 189, Leadville, Colo.	" "
LESAGE, LOUIS	Superintendent Water Works, Montreal, Canada	Sept. 7, 1881.
LIGHT, ALEXANDER L.	Chief Engineer, Quebec, Montreal, Ottawa, & Occidental R. R., Quebec, Canada	" "

PRIOR, CHARLES H.....Supt. Iowa & Minnesota Div. C. M. & St. P. Ry., Minneapolis, Minn,....Mar. 1, 1882.
RICE, GEORGE S.....Charlestown, Ariz.....Feb. 1, 1882.
SAVAGE, ALBERT C.....City Engineer, El Paso, Texas.....May 4, 1881.
SEELY, THOMAS J.....Div. Sup't Atchison, Topeka & Santa Fé R. R., Las Vegas, N. M.....Feb. 1, 1882.
SMITH, CHARLES C.....Chief Engineer St. Paul, Minneapolis & Manitoba R. R., St. Paul, Minn.July 10, 1872.

ASSOCIATE.

FROST, GEORGE H..... Engineering News, Tribune Building, New York City, N. Y.....Jan. 4, 1882.
WATSON, WILLIAM.....107 Marlborough St., Boston, Mass....Mar. 1, 1882.

JUNIOR.

BOGART, JAMES P.....Engineer Conn. Shell Fish Commission, New Haven, Conn.....Jan. 4, 1882.
HAVILAND, ARTHUR.....Asst. Engineer Tehuantepec R. R., Jaltipan, Mexico..... " "

CHANGES AND CORRECTIONS.

MEMBERS.

BLACKWELL, CHARLES.....Supt. Motive Power Norfolk and Western Railway, Roanoke, Va.
BRIGGS, R. E .....Ingeneiro Ferro-caril Central, San Luis Potosi, Mexico.
BRODHEAD, CALVIN E.....White Haven, Pa.
BROUGH, REDMOND J ....City Engineer, Toronto, Canada.
CHITTENDEN, S. H.....Supt. Ivanhoe Mining Co., Grafton, N. M.
CROWELL, J. FOSTER.....Asst. Eng. P. R. R., East Liberty, Pittsburgh, Pa.
CUNNINGHAM, D. W.....Engineer Water Board, Room No. 1, City Hall, Minneapolis, Minn.
DAVIS, CHARLES E. L. B..Capt. Corps of Engineers, U. S. A., Engineer 10th Light House District, Buffalo, N. Y.
EARLEY, JOHN E.....Locating Eng. N. M. & A. R. R., Tucson, Arizona.
FLAD, HENRY.....City Hall, St. Louis, Mo.
HIDER, ARTHUR.....Asst, U. S. Engineer, Duncansby P. O., Miss.
HOWARD, FREDERICK B....57 Lafayette Ave., Detroit, Mich.
JAMES, SAMUEL L.....32 Carondelet St. (Lock Box 437), New Orleans, La.
KIMBERLY, M. C.....Div. Supt. Denver & Rio Grande Ry., South Pueblo, Colo.

LEAVITT, E. D., JR.....604 Main St., Cambridgeport, Mass.
LONG, THOMAS J .....Dept. of Docks, foot W. 24th St., New York City.
MOORE, ROBERT.....102 North Fourth St., St. Louis, Mo.
NICHOLS, O. F.....50 Pulaski St., Brooklyn, N. Y.
NICOLLS, WILLIAM J.....Pottstown, Pa.
POST, JAMES C.....Capt. of Engineers, U. S. A., Jacksonville, Fla.
ROTCH, WILLIAM.....Jamaica Plains, Mass.
SEYMOUR, HORATIO, JR.....Utica, N. Y.
STEPHENS, CLINTON F.....Chief Engineer Texas & St. Louis R. R., Pine Bluff, Ark.
VAN BROCKLIN, MARTIN....Oneida, N. Y.
VAN HORNE, JOHN G.....5 Cortlandt St., Room 77, New York City, N. Y.
WEIR, CHARLES G.....M. L. S. & W. R. R., Ontonagon, Mich.
WELLINGTON, A. M.....Asst. Gen. Man. Mex. Central R. R., San Fernando, Mexico.
WOOD, JOSEPH.....Supt. Motive Power Penna. Co., Fort Wayne, Ind.

JUNIORS.

BULLOCK, WM. D.....City Engineers' office, Providence, R. I.
EMONTS, WM. A. G.....3909 Pine St,, Philadelphia, Pa.
WHITLOCK, FRANK W.....P. O. Box 343, Waterbury, Conn.

RESIGNATIONS.

LARKIN, EDWARD.....December 31, 1881.

DEATHS.

HOLLEY, ALEXANDER LYMAN,
(*Past Vice-President*) Elected Member October 1, 1873. Died January 29, 1882.
LANE, MOSES.....Elected Member December 4, 1867. Died January 25, 1882.
SCOWDEN, THEODORE RANSOM,
Elected Member May 7, 1873. Died December 31, 1881.
WRIGHT, WILLIAM WIERMAN,
Elected Member November 4, 1872. Died March 9. 1882.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—April, 1882.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

MARCH 1ST, 1882.—The Society met at 8 P. M. Mr. T. C. Clarke in the chair.

Ballots for proposed amendments to the Constitution were canvassed with the following results: Upon the following proposed amendment to Article XXII:

Add at end of the article, as follows:

Any member or associate, whose subscription is not in arrears, may compound for future annual subscriptions by the payment of three hundred dollars if he is a resident, and of one hundred and fifty dollars if he is a non-resident. But should a non-resident become a resident he shall pay the remainder of the composition, viz., one hundred and fifty dollars, or the usual annual subscription during the time of his residence.

There were 118 ballots cast; 28 in the affirmative, 86 in the negative and 4 not voting. This proposed amendment to Article XXII not having received an affirmative vote of two-thirds of all the ballots cast, was declared not adopted.

Upon the following proposed amendments to Article XXIV:

After the words "Fellowship Fund," at the end of the first line, insert the words "Ten Thousand dollars of which shall be," so as to read: "There shall be a fund called the Fellowship Fund, ten thousand dollars of which shall be devoted exclusively to the publication of the papers read before the Society," etc., etc.

Also add to the close of the article the words, "Fellows shall be elected in the same manner as Honorary Members."

There were 118 ballots cast; 98 in the affirmative, 5 in the negative and 15 not voting. These proposed amendments to Article XXIV having received an affirmative vote of two-thirds of all the ballots cast, were declared adopted.

Upon the following proposed amendment to Article V:

Second line by striking out the word "five,' and inserting the word "ten," so that it shall read "ten directors."

There were 118 ballots cast; 18 in the affirmative, 86 in the negative and 14 not voting. This proposed amendment to Article V not having received an affirmative vote of two-thirds of all the ballots cast, was declared not adopted.

Upon the following proposed amendment to Article XXXIII:

Strike out the word "October" in the third line and substitute therefor the word "November."

Also strike out the word "February" in the eighth line and substitute the word "March."

There were 118 ballots cast; 96 in the affirmative, 1 in the negative and 21 not voting. This proposed amendment to Article XXXIII having received an affirmative vote of two-thirds of all the ballots cast, was declared adopted.

Ballots for membership were canvassed and the following candidates declared elected as members: John William Andrews, Goldsboro, North Carolina; George Burnet, Jr., Indianapolis, Indiana; William Henry Martin, San Francisco, California; Charles H. Prior, Minneapolis, Minnesota; James Lingan Randolph, Baltimore, Maryland.

The Secretary presented from the Board of Direction a copy of the bill which had been presented to Congress on the subject of Tests of Structural Materials, with a report of the visit of the President and of Members of the Board and of the Society to Washington, and also of the discussion on the subject at the meeting in Washington of the American Institute of Mining Engineers.

Mr. Charles Macdonald offered the following resolutions, which were seconded by Mr. T. C. Clarke and adopted:

Resolved. That in the death of Alexander Lyman Holley, formerly Vice-President of the American Society of Civil Engineers, the engineering profession at large, no less than our own Society, has suffered a grievous loss.

In him were combined not only the inventive genius to discover and successfully apply new methods of subduing the forces of nature for the

benefit of mankind (as evinced in the great industries which have been developed under his direction); but a rare literary facility for arranging and distributing stores of information obtained through patient study of the works of others.

By the example of his life, in his gentleness, his modesty, his deferential consideration of opposing counsels, combined with integrity, indomitable energy and power of work, the standard of our profession has been materially advanced, and a spirit of good fellowship engendered which has had the effect to weld in harmonious continuity of interest the several branches of a profession destined to play an increasingly important part in the advancement of civilization.

Resolved, That a Committee of Five be appointed to act in conjunction with similar committees which have been or may be appointed by the American Institute of Mining Engineers and the American Society of Mechanical Engineers, in any further measures that may be deemed advisable in honor of the memory of our departed fellow member.

Resolved, That we offer to the family of the deceased the assurance of our earnest and respectful sympathy in their affliction.

Resolved, That the Secretary be instructed to transmit copies of the above resolutions to the family, to the Secretary of the American Institute of Mining Engineers, and to the Secretary of the American Society of Mechanical Engineers.

The President has appointed the following named members of the Society as the Committee provided for in the above resolution: Messrs. Charles Macdonald, T. C. Clarke, O. Chanute, Isaac Newton and William G. Hamilton.

The Secretary presented a copy of resolutions, of similar purport, upon the decease of Alexander Lyman Holley, which had been adopted by the American Institute of Mining Engineers.

A paper by W. S. Auchincloss, Member, A.S.C.E., upon the Averaging Machine, was read by the author, practically illustrated upon the machine and discussed by Messrs. T. C. Clarke, Joseph P. Davis, Dresser, George S. Greene, Jr., Katté, Morison, and Prindle.

March 15th, 1882.—The Society met at 8 P. M. President Welch in the chair. The death of William W. Wright, Member A. S. C. E., of Philadelphia, Pa., elected member November 4th, 1872, died March 9th, 1882, was announced.

A paper by E. H. Keating, C. E., City Engineer of Halifax, Nova Scotia, on the Removal of Incrustations in Water Mains, was read by the Secretary and discussed by Messrs. J. C. Campbell, Joseph P. Davis, George S. Greene, Jr., Haswell and Welch.

Remarks upon the subject of the Overflow of the Mississippi River were made by Mr. Lyman Bridges, Member A. S. C. E., and the subject discussed.

April 5th, 1882.—The Society met at 8 P. M., President Welch in the

chair. Ballots were canvassed and the following candidates declared elected: as Members—William Herbert Bixby, Lieut. Corps of Engineers, U. S. A.; Frank Augustus Calkins, New York; Joseph Moss Knap, New York; Charles Penrose Perkins (transferred), Williamsport, Pa.; Benjamin Rhodes, Niagara Falls, N. Y.; Robert Surtees, Ottawa, Canada; as Associate—John Lockwood, New York.

Ballots for a proposed Amendment to the By-Laws were canvassed, as follows: Proposed Amendment to Section 24, Third Clause and Fifth Clause, strike out the word *October* and substitute the word *November*. There were 76 votes in the affirmative and 2 votes in the negative.

This proposed amendment to Section 24 of the By-Laws, having received an affirmative vote of two-thirds of all the ballots cast, was declared adopted.

On motion, the Board of Direction was requested to submit to the Society a plan for life membership embodying with it a plan for commutation of dues by one payment.

A paper by Alfred P. Boller, Member A. S. C. E., on the "Mode of Underpinning adopted for the Croton Lake Bridge, New York City and Northern Railroad, during the repairs to the Masonry Piers," was read by the Secretary and discussed by members present.

The paper by L. Bridges, M. A. S. C. E., on the Overflow of the Mississippi River, read at the last meeting, was further discussed.

OF THE BOARD OF DIRECTION.

JANUARY 4, 1882.—Applications were considered. Mr. O. Chanute was added to the Committee on Preservation of Timber, and requested to serve as chairman. Action was taken as to arrears of dues. The subject of Tests of Iron and Steel was referred to a Sub-Committee for consideration. Arrangements were made for the approaching Annual Meeting, and Messrs. Bogart, Dresser, Emery, William H. Paine and C. V. Smith, were appointed a Committee of Arrangements for that meeting.

Appropriations were made.

JANUARY 16, 1882.—A report was received from the Committee appointed at the Montreal Convention on Tests of Iron, Steel and other Metals. The subject was discussed. Vice-Presidents Chanute and Welch were appointed a Committee to present the subject to the Society at the Annual Meeting. The Annual Report prepared by Secretary Bogart, was read, amended and adopted. The following resolution was adopted:

Resolved, That the Secretary be directed to send to each journal which receives the Transactions of this Society in exchange, a notice that the Publications of the Society are copyrighted, and that the condition of exchange is that in republishing any of the papers or plates published

in the Transactions, they shall be credited to the Transactions of the Society.

JANUARY 25, 1882.—The Board elected at the Annual Meeting, January 18, 1882, met, and under the provisions of the Constitution, the following Standing Committees were appointed :

ON FINANCE :

WILLIAM H. PAINE,
JOSEPH P. DAVIS,
GEORGE S. GREENE, JR.

ON LIBRARY :

J. JAMES R. CROES,
THOMAS C. KEEFER,
GEORGE W. DRESSER.

The subject of the date for the next Convention, referred by the Society to the Board, was referred to a Committee for consideration and report.

A Committee was appointed to confer with Mr. T. F. Rowland on the institution of the Rowland Prize, as determined by the Society at the Annual Meeting.

A Committee was appointed to draft a memorial, and to recommend suitable action upon the subject of Testing Structural Material.

Appropriations were made.

FEBRUARY 1, 1882.—Applications were considered. Upon report of the Committee the date for the Annual Convention, at Washington, was fixed as May 16, 1882. The Committee on the Rowland Prize reported results of an interview with Mr. T. F. Rowland, and a letter from him on the subject. The Committee was continued. The issue of a circular suggested by the Committee on Standard Time, was considered. A memorial on the subject of Tests of Iron and Steel was discussed.

FEBRUARY, 15, 1882.—A memorial on the subject of Tests of Structural Materials, and the draft of a law on that subject, were adopted. A Committee was requested to visit Washington to promote the investigation of the strength and properties of structural materials. Applications were considered.

MARCH 8, 1882.—Applications were considered. The Secretary submitted a transcript from the books showing the number of members in arrears for dues, with the amount of arrears. It was resolved that the action directed by the Constitution be taken, and that the form of notice prescribed by it be sent to all members in arrears for more than the current dues. At the request of the President the Board considered the question of calling a convention on the subject of Standard Time, and the opinion of the Board was declared that the most suitable time for such

convention would be after receipt of replies to a circular issued by the committee on that subject, and further report by that committee.

The President reported result of the visit of himself and the Secretary to Washington, on the subject of a continuance of tests upon Structural Materials; the meeting with other members of the Society; the presentation of a law and memorial to the Chairman of the Committee on Manufactures of the House of Representatives. The Secretary was authorized to issue a note to members on the subject.

The Secretary announced the gift from the Institution of Civil Engineers, of the Minutes of the Proceedings of that Institution, Volumes I to XX, inclusive, with Vol. 3, of the quarto early set, thus making complete the set of those publications belonging to this Society. The thanks of the Board were ordered presented to the Institution of Civil Engineers.

Appropriations were made.

MARCH 29TH, 1882.—Applications were considered. Arrangements made for the Annual Convention. The purchase of the professional library of the late James P. Kirkwood, Past President A. S. C. E., was authorized. The draft of a letter to Members on the subject of tests of structural materials, was presented by the Secretary and its issue directed.

APRIL 5TH, 1882.—Applications were considered. Action was taken as to Arrears of Dues. Financial business was transacted and appropriations were made.

ADDITIONS TO

LIBRARY AND MUSEUM.

From Wm. P. Shinn, New York:

Annual Report of the Secretary of Internal Affairs of the Commonwealth of Pennsylvania. Volumes IV, V, VI and VII.

Report of the Commissioners of Agriculture. Washington. 1863.

Report of the Secretary of War, being part of the Message and Documents communicated to the Two Houses of Congress at the beginning of the First Session of the 44th Congress. Vol. II. Parts I and II. Washington. 1875.

Annual Report of the Bureau of Statistics of Labor of the Commonwealth of Pennsylvania. 1872-3. Harrisburg. 1874. (3 copies.)

Annual Report of the Ohio State Board of Agriculture. Columbus. 1871.

Annual Statement of the Trade and Commerce of Chicago to the Board of Trade. Chicago. 1869.

Annual Report of the Chief of the Bureau of Statistics on Commerce and Navigation. Washington. 1877.

Geology of Wisconsin. Survey of 1878-1879.

Annual Report of the Commissioners of Mineral Statistics of Michigan for 1877-8, and previous year. Marquette. 1879. (2 copies.)

Report of the Bureau of Agriculture Statistics and Mines for 1876. Nashville, Tenn. 1877.

Annual Report of the Trade and Commerce of Chicago for 1864, 1866 to 1868, and 1871, 1877 and 1879.
Annual Report of the Packing of the West. Chicago. 1877.
Annual Report of the Department of Public Works of Chicago. Chicago. 1878-1879. (2 copies.)
Communication from the State Engineer of the State of New York, transmitting a Special Report on Coal. Albany. 1865.
Industrial Arbitration and Conciliation in France and England. Jos. D. Weeks. Pittsburg. 1879. (2 copies.)
The Methods of Testing Steam Engines, with a description of the Trials of the Blake's Patent Circulating Pumps, on the U. S. S. Tennessee. Philadelphia. 1874
The Pacific Railroads and the relations existing between them and the Government of the United States. New York. 1879.
Report of the Bridging of the Mississippi, between St. Paul and St. Louis. G. K. Warren. Washington. 1878.
The Agricultural and Mineral Wealth of Tennessee. J. B. Killebrew. Nashville. 1876.
Memoir of the Iron Bridge over the Missouri River at St. Joseph, Mo., by the Detroit Bridge and Iron Works.
Proceedings of the Road Masters' Meeting of the Atlantic and Great Western Railroad. Meadville, Pa. 1878.
Sandvick Exhibition of Bessemer Steel at Philadelphia, 1876.
Statistics and Information relative to the Trade and Commerce of Buffalo. Buffalo. 1875.
Annual Report of the Board of Trade of Portland. Portland. 1864.
Annual Report of the Secretary of the Navy on the Operations of the Department for the year 1877.
Annual Report of the United States to the Secretary of the Treasury. Washington. 1873.
Method and Cost of Mining Specular and Magnetic Ores. T. B. Brooks, New York. 1873.
Chemical Composition of Ores—Analysis. T. B. Brooks. New York. 1873.
Historical Sketch of the Discovery and Development of Ores. T. B. Brooks. New York. 1873.
Magnetism of Rocks and Use of the Magnetic Needle in Exploring for Ore. T. B. Brooks. New York. 1873.
Geology of the Marquette Iron Region. T. B. Brooks. New York. 1873.
Explorations (Prospecting for Ore). T. B. Brooks. New York. 1873.
Second Annual Report of the Commission on Steam and Canals. Albany. 1873.
Directory of the Iron and Steel Works of the United States. Philadelphia. 1880.
Report of the Transportation Bureau of the Merchants' Exchange of St. Louis. St. Louis. 1873.
Iron Ores and other Minerals from the New River in Virginia. Philadelphia. 1876.
An Address at the Reopening of Pardee Hall, Lafayette College, November 30, 1880. Easton, Pa. 1881.
Testimonial to Alexander Lyman Holley. At the Reception of the American Institute of Mining Engineers, at Pittsburg, May 15, 1879. (Several copies.)
A General Account of the Commonwealth of Kentucky. Cambridge. 1876.
Annual Report of the Chief Engineer of the Water Department of Philadelphia. Philadelphia. 1876.
The Census of Iowa as returned in the year 1869. Des Moines. 1869.
Safety of Permanent Way, with Drawings and Tables concerning Punching and Notching of Rails. C. P. Sandberg. London. 1874.
Annual Report of the American Iron and Steel Association, containing the Statistics of the American Iron Trade. Philadelipha. 1879.
History, Position, Resources and Industries of the State of Wisconsin. Madison. 1875.
The Iron and Steel Exhibits of the Universal Exposition of 1878 at Paris. Philadelphia. 1879.
Report of the Select Committee on Transportation Routes to the Seaboard. Washington. 1874.
Proceedings of the Senate Committee on Transportation Routes to the Seaboard. New York. 1873.
Resources and Capabilities of the Oil Region of Tennessee. J. B. Killebrew. Nashville. 1877.
History and Review of the Mineral Resources of Lake Superior. A. P. Swineford. Marquette. 1876.
Statements of the Coal and River Trade in Opposition to the Davis Island Dam, Washington, D. C.
Hardening Iron and Steel, its Causes and Effects. R. Akerman.
The State of the Iron Manufacture in Sweden. R. Ackerman. Stockholm. 1876.
Kirkaldy's Experimental Inquiry into the Mechanical Properties of Fagersta Steel. London. 1876.
Report of a Committee on Repairs of Roads. Boston. 1865.
Useful Information on Practical Electric Lightning. K. Hedges. London and New York. 1879.
The Chemical Compostion and Physical Properties of Steel Rails. Easton, Pa. 1879.
Annual Report of the Monongahela Navigation Company. Pittsburg. 1879.
Report of the Railroad Commissioners of the State of Connecticut for 1880, 1881.
Memorial of the Chicago and Northwestern and Chicago, Milwaukee and St. Paul Railway Companies. Chicago, 1875, 1876.
Annual Report of the Michigan Southern and Northern Indiana Railroad Company for 1867.
Annual Report of the Lake Shore and Michigan Southern Railroad for 1873, 1876 and 1880.
Report of the Special Committee on Railroads and Telegraphs, made to the Senate of Ohio. 1867, 1868 and 1870.
Report on the Hudson River Railroad. John B. Jervis. New York. 1846 and 1848.
Annual Report of the Cleveland and Pittsburg Railroad Company, for 1869, 1870 and 1871.
Annual Report of the State Engineer and Surveyor of the State of New York, from 1865 to 1868, inclusive. (2 copies.)
Annual Report of the Water Commissioners of Lowell, Mass., for 1873 and 1878.

Reports of the Board of Railroad Commissioners of Massachusetts, for 1872 and 1879.
Blank Statement of the Massachusetts Railroad Commissioners. 1876.
Annual Report of the Commissioners of Railroads and Telegraphs of Ohio, for 1871, 1872, 1873, 1875 and 1876.
Annual Report of the Auditor-General of the State of Pennsylvania, on Railroads and Canals, for 1866, 1867, 1868, 1869, 1870, 1874.
By-Laws and Organization of the Alleghany Valley Railroad Company. Pittsburg. 1875.
Annual Reports of the Alleghany Valley Railroad Company, for 1866, 1870, 1873, 1875, 1876, 1877, 1880 and 1881.
Annual Report of the Pittsburgh, Titusville and Buffalo Railway, for 1876, 1877, 1879 and 1880.
Report of the Pittsburg, FortWayne and Chicago Railway, from 1863 to 1868, inclusive.
Annual Report of the Railroad Commissioners of Massachusetts, for 1874, 1875, 1876 and 1878.
Reports of the several Railroad Companies of Pennsylvania, for 1861 and 1864.
Annual Reports of the Pennsylvania Railroad Company, for 1867, 1870, 1871, 1874, 1875 and 1877.
Report of the Investigating Committee of the Pennlylvania Railroad Company. Philadelphia. 1874.
Annual Report of the Railroad Commissioners of Iowa. Des Moines. 1879.
Report of the New York and Erie Railroad. New York. 1853 and 1856.
Annual Report of the Grand Rapids and Indiana Railroad Company. Grand Rapids. 1873.
Tables of Astronomical and Trigonometrical Survey of Massachusetts. J. G. Palfrey. Boston. 1846.
Annual Report of the St. Louis and Southeastern Railway Company. St. Louis. 1878.
Report of the Commissioners to Examine the Services from which a supply of pure Water may be obtained for the City of Boston. Boston. 1845.
Annual Report of the St. Louis, Iron Mountain and Southern Railway Company. St. Louis. 1878.
Annual Report of the Philadelphia and Erie Railroad Company. Philadelphia. 1879.
Annual Report of the Auditor of the Canal Department on the Tolls, Trade and Tonnage of the State of New York. Albany. 1867.
Report of the Commissioners of the Troy and Greenfield Railroad and Hoosac Tunnel. Boston. 1863.
Annual Report of the New York Central Railroad Company. Albany. 1866.
Revised By-Laws and Organization of the Pennsylvania Company. Pittsburg. 1873. (2 copies.)
Annual Report of the Pittsburg, Cincinatti and St. Louis Railway Company. Philadelphia. 1880.
Tabulated Results compiled from the Annual Reports of Railroad, Passenger Railway, Canals and Telegraph Companies of Pennsylvania. Harrisburg. 1875.
Proceedings of the Annual Meeting of the Stockholders of the Pennsylvania Railroad Company. Philadelphia. 1867.
Report of Experiments with Coal-Burning Locomotives, made on the Pennsylvania Railroad. Philadelphia. 1860.
Annual Report of the North Pennsylvania Railroad Company. Philadelphia. 1869.
Annual Report of the Grand Rapids and Indiana Railroad Company. Fort Wayne. 1869.
Cost, Revenue and Expenditure of the Public Works of Pennsylvania. Harrisburg. 1854.
Report of the President and Directors of the Seaford and Roanoke Railroad Company. Norfolk. 1874,
Report of the Indianapolis, Cincinnati and Lafayette Railroad Company. Cincinnati. 1875.
Report on the Question of Bridging the Missouri River. J. L. Williams. Fort Wayne. 1867.
Report of the Central Railroad and Banking Company of Georgia. Savannah. 1875.
Report of the Chief Engineer of the Union Pacific Railroad. G. M. Dodge. Washington. 1868,
Report of the Consulting Engineer of the Union Pacific Railroad. Silas Seymour. New York. 1866.
The Proposed American Inter-Oceanic Canal in its Commercial Aspects. Joseph Nimmo, Washington. 1880.
The Census of Iowa, as returned in the year 1867.
Description of the Croton Aqueduct. John B. Jervis. New York. 1842.
Report of the Chief Engineer of the Providence Water Works. Providence. 1871.
Description of the Boston Water Works. 1878.
Proceedings of the Railroad Convention, held at the St. Nicholas Hotel, New York. Albany. 1860.
Annual Report of the American Railway Master Mechanics' As ociation in Convention at Boston. Cincinnati. 1872.
Report upon the Proposed Railway from Pittsburg, Pa., to the James River Valley. Va.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
KNAP, JOSEPH M.	365 West St., New York City, N. Y.	April 5, 1882.
SICARD, MIRTILIANO	Ibagué, Tolimo, U. S. Colombia	Jan. 4, 1882.

ASSOCIATE.

LOCKWOOD, JOHN.....Gas and Hydraulic Engineer, 61 Broadway, New York City, N. Y.....April 5, 1882.

JUNIOR.

KELLY, CASSIUS W.....18 City Hall, New Haven, Conn.....March 1, 1882.

CHANGES AND CORRECTIONS.

MEMBERS.

ANDERSON, THOMAS S...San Antonio, Texas.
BELKNAP, MORRIS S....Supt. M. and M. Div. L. & N. R. R. Montgomery, Ala.
BLICKENSDERFER, R....Div. Eng. and Supt. Constr. Utah & Northern R. R. Silver Bow Junction, Montana.
BRIGGS, ROBERT.....1125 Girard St., Philadelphia, Pa.
BRUNER, D. P..... 110 N. Second St., Harrisburg, Pa.
DEFREES, M. M.....Engr. in Chg. Bridges and Buildings, Ind. B. & W. R. R. and Ohio So. R. R., Indianapolis, Ind.
GLOVER, O. L.....Pittsfield, Mass.
GOULD, JAMES P.....Buxton P. O., Traill Co., Dakota.
HYDE, WILLIAM B.....Custer City, Idaho.
LOW, GORHAM, P., Jr..Supt. Road Dept. E. C. & N. R. R., Norfolk, Va.
MCCLINTOCK, W. H.....Supt. Road Dept. L. & N. R. R., Louisville, Ky.
MEIGS, MONTGOMERY...U. S. Civil Engineer, Keokuk, Ia.
MERRILL, WILLIAM F...Asst. Gen. Supt. W., St. L. & P. R. R., St. Louis, Mo.
NICHOLSON, GEORGE B.Engr. South. Div. N. O. & N. E. R. R., New Orleans, La.
NOBLE, ALFRED.....U. S. Asst. Engineer, Sault Ste. Marie, Mich.
POST, LEVI W.....Lock Box 18, Memphis, Tenn.
PREVOST, S. M.....Supt. Phila. Div. P. R. R., W. Philadelphia, Pa.
YARDLEY, EDMUND.....Master of Road, Pittsburg Div. B. & O. R. R., Connellsville, Pa.

JUNIOR.

BUTTS, EDWARD.....Union Pacific R'w'y., Room S., Union Depot, Denver, Colo.

DEATHS.

FORSHEY, CALEB G.....Elected Member August 7, 1872; died April, 1872.
HOWELL, CHARLES W...Elected Member, March 3, 1875; died April 5, 1882.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—May, 1882.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

ANNUAL CONVENTION OF THE SOCIETY.

HELD IN THE CITY OF WASHINGTON, D. C., ON THE 16TH, 17TH, 18TH AND 19TH OF MAY, 1882.

FIRST SESSION.

TUESDAY, MAY 16TH, 1882.—The Convention was called to order at 10 A. M. by Mr. JOHN BOGART, Secretary of the Society, who requested the President, Mr. ASHBEL WELCH, to temporarily take the Chair. The Secretary then read the provisions of the By-Laws relating to Conventions. In accordance with these provisions and with the custom the Committee of Members resident in Washington was requested to nominate a permanent Chairman of the Convention. The Chairman of that Committee, Col. T. L. CASEY, Director of the Society, thereupon nominated Gen. HORATIO G. WRIGHT, Chief of Engineers, U. S. A., which nomination was seconded and ratified by the Convention, and he was declared elected permanent Chairman.

The President of the Society thereupon announced that, on account of severe illness, Gen. Wright was unable to leave his house that morning, although he had fully hoped and expected to be present. Under these circumstances the President suggested that until the Chairman should be able to meet with the Convention, another member should be chosen as Chairman *pro tempore*. Thereupon, on nomination, Col. THOMAS L. CASEY was elected Chairman *pro tempore*.

Col. CASEY, on taking the Chair, informally welcomed the Society to the City of Washington, and referred to the works of engineering interest in it and its vicinity. The President of the Society made a short response.

The Secretary then announced the details of the programme for each day.

A paper entitled "An Instance of Zymotic Disease in Metals," by O. E. Michaelis, Member A. S. C. E., was read by the author and discussed by T. Egleston, Member A. S. C. E.

The subject of a place for holding the next Annual Convention was considered, and D. J. Whittemore, Member A. S. C. E., suggested the City of Minneapolis, Minn., presenting reasons for holding the Convention at that place. T. Egleston, Member A. S. C. E., suggested the consideration of some point in the extreme West as desirable for a future Convention. The determination of this question was postponed until the next Annual Meeting.

The report of the Committee upon a Uniform System for Tests of Cement was then read by the Chairman of the Committee as follows:

MILWAUKEE, May 6, 1882.

JOHN BOGART, Esq.,

Secretary American Society of Civil Engineers:

DEAR SIR,—As chairman of the committee for devising a uniform system of cement tests, I regret to report that my professional duties as Chief Engineer of the Chicago, Milwaukee & St. Paul Railway Co. (now operating 4,300 miles of road, 430 of which was built under my supervision the last year) have prevented me from giving the matter of cement tests but slight attention. Had the time been at my disposal I could not report understandingly on mortars composed of cement and sand, owing to the fact that but very few of the Engineers of this Society have responded to the call for sands from their several localities, without which it is impossible to select a standard sand that can be easily obtained by all experimenters. It is quite probable, that during the present year my professional duties will be such that I shall be unable to properly act as chairman of said committee, and it would be a relief to me if the directors of your Society would indicate some other person who has the time to devote to this important subject, to act as chairman in my place.

All of which is respectfully submitted.

D. J. WHITTEMORE,
Chairman.

On motion of Charles E. Fowler, M. A. S. C. E., the report was accepted and the same committee continued.

The Convention then adjourned until 1.30 P. M.

SECOND SESSION.

TUESDAY, MAY 16TH, 1.30 P. M.—The Convention was called to order, and in the temporary absence of the Chairman, O. E. Michaelis, M. A. S. C. E., was requested to preside.

The Secretary presented invitations to visit the offices of the United States Coast and Geodetic Survey, also the Museum of the Ordnance Department, the Corcoran Art Gallery and the Cosmos Club, which invitations were accepted.

The report of the Committee on the Preservation of Timber was presented and read by O. Chanute, Chairman of the Committee.* Messrs. J. W. Putnam and E. R. Andrews, of the Committee, also presented communications on this subject.

The Convention then adjourned till 8 P. M. The members at 3 P. M. visited the Capitol and the offices of the Coast and Geodetic Survey.

THIRD SESSION.

TUESDAY, MAY 16TH, 8 P. M.—The Convention was called to order, Col. T. L. Casey, Director A. S. C. E., in the Chair. The President of the Society, Mr. ASHBEL WELCH, then delivered his annual address.†

Upon the conclusion of the address the Secretary announced that at 10 A. M. of the following morning a visit would be made to the Washington Monument, and requested Col. T. L. Casey, Engineer in charge of that work, to give some information as to its condition and progress.

Col. T. L. Casey then informally addressed the Convention upon this subject.

After a number of announcements by the Secretary the Convention adjourned until May 17th, at 2 P. M.

NOTE.—On Wednesday morning, May 17th, a visit was made to the Washington Monument, and the work in progress inspected under the guidance of Col. T. L. Casey. Visits were also made to the Sewerage Works of the City, under the charge of the Engineers of the District Commission, the party being conducted by Lieut. R. L. Hoxie, Corps of Engineers, U. S. A. Also to the works where the Asphaltic Material for Street Pavements are prepared, which were explained by D. E. McComb, M. A. S. C. E. Visits were also made to the Bureau of Engraving and Printing, Department of Agriculture and Smithsonian Institution.

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* Will be published hereafter.

† Published in Transactions.

FOURTH SESSION.

WEDNESDAY, MAY 17TH, 2 P. M.—The Convention was called to order, Col. T. L. Casey, Director A. S. C. E., in the Chair. The report of the Committee on the Preservation of Timber was discussed by Messrs. J. B. Francis, T. Egleston, M. Cohen, F. Collingwood, E. R. Andrews, L. Bridges, Clemens Herschel, A. Gottlieb, T. F. Rowland and John Bogart.

A paper by A. G. Menocal, M. A. S. C. E., entitled Subaqueous Underpinning,* was read by the Secretary and discussed by members present.

The business meeting of the Society then occurred, for minutes of which see page 71.

After the business meeting the session of the Convention was resumed, Col. F. U. Farquhar, M. A. S. C. E. in the Chair. On motion the discussion of the Subject of Structural Materials was made the order for 8.30 P. M.

Announcements were made and the Convention then adjourned until 8 P. M.

FIFTH SESSION.

WEDNESDAY, MAY 17TH, 8 P. M.—The Convention was called to order, Col. T. L. Casey, Director A. S. C. E., in the Chair.

A paper on the Overflow of the Mississippi River, by Lyman Bridges, M. A. S. C. E., was discussed by the author and E. L. Corthell, M. A. S. C. E.*

The subject of Tests of Structural Materials was then taken up and discussed by Messrs. A. Dempster, T. Egleston, F. Collingwood, A. Gottlieb, O. E. Michaelis, O. Chanute, T. C. Clarke, T. L. Casey, J. J. R. Croes, John Bogart, A. Coffin, A. P. Boller, J. P. Davis and Theodore Cooper.

The Convention then adjourned until 3 P. M., May 19th.

NOTE.—On Thursday, May 18th, at 10 A. M., an excursion was made by steamboat on the Potomac to Mount Vernon. Several hours were spent at that place, and on returning the party was landed at the Washington Navy Yard, where, under escort of Civil Engineer A. G. Menocal, M. A. S. C. E., and the officers of the Navy Yard, an inspection was made of various matters of interest.

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* To be published in Transactions.

On the evening of Thursday a reception was given at Willard's Hall and Hotel by the President of the Society, Mr. Ashbel Welch. This reception was attended by the members of the Society and their families, and by a large number of invited guests.

On Friday, May 19th, at 9 A. M., an excursion was made in carriages to the Washington Aqueduct, and to the Cabin John Bridge, the stone arch of 220 feet span carrying that aqueduct over a stream about seven miles distant from Washington.

In returning a visit was made to the Inclined Plane and Caisson connecting the Canal and River at Georgetown.

At 3 P. M. the same afternoon the members of the Society and their families were received at the Executive Mansion by the President of the United States, after which the Conservatory and all the rooms of the White House were thrown open for inspection.

SIXTH SESSION.

FRIDAY, MAY 19TH, 4 P. M.—The Convention was called to order, Col. T. L. Casey, Director A. S. C. E., in the Chair.

A paper by William Sooy Smith, M. A. S. C. E, on the Hudson River Tunnel, was read by the Secretary and discussed by W. H. Paine, M. A. S. C. E.

The following papers were presented by the Secretary and read by title, the time determined for the adjournment of the Convention preventing their being read in full.

Description of some experiments on the Flow of Water, made during the construction of works for conveying the water of Sudbury River to Boston: A. Fteley and F. P. Stearns.

Targets for Rifle Ranges: O. E. Michaelis.

Accuracy of Measurement as increased by Repetition: S. S. Haight.

Highway Bridges: James Owen.

On motion of J. James R. Croes, Treasurer A. S. C. E., it was resolved that the thanks of the Society in Convention assembled be presented to Col. T. L. Casey, Chairman *pro tempore*, and also to the local committee of members resident at Washington, who have been in charge of the arrangements for the Convention and to others who have aided in carrying out these arrangements.

Upon motion, the Chairman *pro tempore*, with a few remarks, declared the Convention adjourned *sine die*.

NOTE.—On Saturday morning, May 20th, an excursion was made to Pen-Mar. This excursion was tendered through the kindness of the Pennsylvania, the Baltimore and Potomac, and the Western Maryland Railroads, and was under the immediate escort of Mr. H. F. Walling, M. A. S. C. E.

The company left Washington at 8.30 A. M., proceeded to Baltimore, and thence to Pen-Mar Station. Carriages were then taken to High Rock, an elevated point of the Blue Ridge Mountains.

The Heliostat operations as used by the United States Coast and Geodetic Survey were here exhibited.

After lunch at Pen-Mar, the party returned to Baltimore in time to take the evening trains both North and South.

The following is a copy of the printed programme issued to the members present :

PROGRAMME.

TUESDAY, MAY 16TH, 10 A. M.—Meeting for organization, Willard Hall, F. Street, between 14th and 15th. Selection of Officers of Convention ; Reading of Papers and Professional Discussion.

1.30 P. M.—Meeting ; Reading of Papers and Professional Discussion.

3 P. M.—Visit to Capitol.

8 P. M.—Meeting ; Annual Address by Ashbel Welch, Esq., President of Am. Soc. of Civil Engineers.

WEDNESDAY, MAY 17TH, 10 A. M.—Visit to Washington Monument.

2 P. M.—Meeting ; Reading of Papers and Professional Discussion.

3 P. M.—Regular Meeting of the Society for transaction of business.

8 P. M.—Meeting ; Reading of Papers and Professional Discussion.

THURSDAY, MAY 18TH, 10 A. M.—Excursion on Potomac ; Examination of Harbor of Washington and Excursion to Mount Vernon ; on return, visit to Washington Navy Yard, from 4 to 6 P. M.

8.30 P. M.—Reception by President of the Society at Willard Hall and in parlors of Willard's Hotel.

FRIDAY, MAY 19TH, 9 A. M.—Excursion to Washington Aqueduct, Cabin John Bridge, and the Inclined Plane and Caisson connecting Canal and River at Georgetown.

3 P. M.—Meeting ; Reading of Papers and Professional Discussion.

SATURDAY, MAY 20TH.—An Excursion to Pen-Mar has been arranged for this day, which will be so timed as to enable members to reach New York if desired at 10.20 P. M.

The following papers will be presented and discussed :

The Hudson River Tunnel : Gen. Wm. Sooy Smith.

Description of some experiments on the Flow of Water, made during the construction of works for conveying the water of Sudbury River to Boston : A. Fteley and F. P. Stearns.

Subaqueous Underpinning : A. G. Menocal, U. S. N.

Targets for Rifle Ranges : Capt. O. E. Michaelis.

Peculiar Phase of Metallic Behavior : Capt. O. E. Michaelis.

Accuracy of Measurement as Increased by Repetition : S. S. Haight.

Highway Bridges : James Owen.

Papers presented to the Society during the past year will also be discussed.

Reports will be expected from the Committees on Standard Time ; on the Preservation of Timber ; on Testing Cements, and those subjects will be discussed.

The proposed provisions for testing iron, steel and other structural materials, will also be discussed.

Headquarters of the Society, Parlor No. 10, Willard's Hotel.

COMMITTEES.

Local Committee : Chairman, Col. T. L. Casey, U. S. A.

On Programme : Genl. H. G. Wright, U. S. A.; Prof. J. E. Hilgard, U. S. C. and G. S.

On Entertainment and Finance : A. G. Menocal, Civil Engineer U. S. N.; Col. F. U. Farquhar, U. S. A.; J. B. Duncklee.

On Transportation : S. Thayer Abert, Ed. L. Du Barry.

On Hotel Accommodation : David E. McComb, H. F. Walling.

The following members were in attendance at the Convention : —S. Thayer Abert, Washington, D. C.; W. M. Allaire, E. R. Andrews, New York City ; George D. Ansley, Montreal, Canada ; W. S. Barbour, Cambridgeport ; H. Bissell, Salem, Mass.; H. D. Blunden, John Bogart, A. P. Boller, New York City ; L. L. Buck, Brooklyn ; W. H. Burr, Troy, N. Y.; A. Bonzano, Phœnixville, Pa.; G. Bouscaren, Cincinnati, Ohio ; Onward Bates, St. Louis, Mo.; J. D. Burr, Topeka, Kansas ; Lyman Bridges, San Francisco, Cal.; S. H. Chittenden, East River, Conn.; O. Chanute, T. C. Clarke, F. Collingwood, Theodore Cooper, E. L. Corthell, J. J. R. Croes, New York City, N. Y.; Amory Coffin, Phœnixville, Pa.; Mendes Cohen, Baltimore, Md.; T. L. Casey, Washington, D. C.; J. P. Davis, New York City ; W. A. Doane, Oswego, N. Y.; E. L. Du Barry, John B. Duncklee, Washington, D. C.; Charles Davis, Alleghany City ; A. Dempster, Pittsburgh, Pa.; Fred. De Funiak, Louisville, Ky.; T. Egleston, New York City, N. Y.; Robert Fletcher, Hanover, N. H.; Edward A. Flint, A. Fteley, Boston ; James B. Francis, Lowell, Mass.; Charles A. Ferry, Charles E. Fowler, New Haven, Conn.; John W. Ferguson, Hornellsville, N. Y.; Clark Fisher, Trenton, N. J.; F. U. Farquhar, Washington, D. C.; C. G. Force, Cleveland, Ohio ; Sandford Fleming, Ottawa, Canada ; George S. Greene, George S. Greene, Jr., New York City, N. Y.; F. Graff, Philadelphia ; A. Gottlieb, Pittsburgh, Pa.; Chas. E. Goad, Montreal, Canada ; Clemens Herschel, Holyoke, Mass.; A. B. Hill, New Haven, Conn.; S. S. Haight, Wm. G.

Hamilton, New York City, N. Y.; J. E. Hilgard, Washinton, D. C.; J. H. Harlow, Pittsburgh, Pa.; Wm. P. Harris, Huntington, W. Va.; Charles Hermany, Louisville, Ky.; Geo. A. Kimball, Somerville, Mass.; L. H. Knapp, Buffalo, N. Y.; T. C. Keefer, Ottawa; John Kennedy, Montreal, Canada; C. H. Latrobe, Baltimore, Md.; G. P. Low, Jr., Norfolk, Va.; W. H. Lotz, Chicago, Ill.; Louis Lesage, Montreal, Canada; T. C. McCollom, New London; T. H. McKenzie, Southington, Conn.; G. W. McNulty, Brooklyn; George S. Morrison, New York City; D. N. Melvin, New Springville, N. Y.; O. E. Michaelis, Philadelphia, Pa. D. E. McComb, A. G. Menocal, Washington, D. C.; Alfred Noble, Sault Ste. Marie, Mich.; L. F. Olney, Middletown, N. Y.; J. A. Ockerson, St. Louis, Mo.; S. C. Pierson, Meriden, Conn.; W. H. Paine, F. C. Prindle, Brooklyn, N. Y.; George H. Pegram, Wilmington, Del.; O. M. Poe, Washington, D. C.; J. W. Putnam, New Orleans, La.; Joseph R. Richards, Boston, Mass.; Thomas F. Rowland, Greenpoint, N. Y.; Wm. M. Reed, Erie; David Reeves, Phœnixville, Pa.; F. P. Stearns, Boston, Mass.; W. H. Searles, Newburg, N. Y.; S. M. Smedley, Philadelphia, Pa.; R. A. Shailer, Wilmington, Del.; J. G. Van Horne, Jersey City, N. J.; Wm. H. Wiley, Wm. E. Worthen, New York City, N. Y.; C. D. Ward, L. B. Ward, Jersey City; Ashbel Welch, Lambertville, N. J.; H. F. Walling, Washington, D. C.; T. J. Whitman, St. Louis, Mo.; D. J. Whittemore, Milwaukee, Wis.; J. A. L. Waddell, Council Bluffs, Iowa.

NOTE.—Forty-eight ladies of the families of members accompanied them on their visit to Washington on the occasion of this Convention.

MEETINGS OF THE SOCIETY.

APRIL 19TH, 1882.—The Society met at 8 P. M., Mr. George W. Dresser, Director A. S. C. E. in the Chair.

The deaths of Capt. C. W. Howell, Corps of Engineers, U. S. A., elected member March 3d, 1875, died April 5th, 1882; and of C. G. Forshey, elected member August 7th, 1872, died April, 1882, were announced.

Plans and profiles of works proposed for the drainage of the Valley and City of Mexico were exhibited and explained by Mr. Ricardo Orozco, C. E.

MAY 3D, 1882.—The Society met at 8 P. M., President Ashbel Welch in the Chair.

Ballots for membership were canvassed and the following candidates declared elected as members: William Giddings Curtis, San Francisco, California; Edward C. Kinney, Des Moines, Iowa; Gustav Lindenthal,

Pittsburgh, Pennsylvania; Thomas Chalmers McCollom, New London, Connecticut; David Reeves, (elected Junior April 1st, 1874,) Phœnixville, Pennsylvania.

The Secretary announced the general programme for the approaching Convention as arranged at a meeting by him with members resident at Washington.

A paper by William R. Hutton, M. A. S. C. E. on the Improvement of the Potomac River, at Washington, was read by the Secretary and discussed by Messrs. Bridges, Bogart, Emery and Haswell.

MAY 17TH, 1882.—Business meeting at the Annual Convention. The meeting of the Society for the transaction of business was called to order, the President Mr. Ashbel Welch in the Chair.

The President stated the action of the Board of Direction of the Society upon the subject of the introduction and framing of a law adequate to resume the investigation into the strength of structures, and the parts and materials of which they are composed, which subject had been referred to the Board at the last Annual Meeting.* A copy of the bill which had been introduced in Congress was presented as follows:

TESTS OF STRUCTURAL MATERIALS.

NOTE.—The Bill of which the following is a copy, was introduced in the House of Representatives March 1st, 1882, by Hon. J. M. Campbell, Chairman of the Committee on Manufactures, read twice and referred to that Committee. The Bill is numbered H. R. 4,726.

A BILL

Authorizing the President to appoint a commission of experts, skilled in the investigation, production and use of metallic substances and other structural materials, to execute tests and experiments on iron, steel and other materials used in the construction of bridges, buildings and mechanical structures, and deduct useful rules therefrom.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

SEC. 1. That the President of the United States be and he is hereby authorized to appoint a commission of seven members selected from among men skilled in the investigation, production and use of metallic substances and other structural materials, to hold their appointment during the pleasure of the President of the United States; which commission shall plan and superintend the execution of such tests and investigations of materials used extensively in the construction of buildings, bridges, ships and other structures and machinery, as it shall think

* See Proceedings, Vol. VIII, January, 1882, p. 28

most important to be made, and from time to time publish results of the tests and investigations, and also such scientific principles and such practical rules deduced therefrom as it shall consider most useful. The said commission shall organize itself, and adopt such rules, and make such assignment of duties among its members as it shall deem most promotive of the object of its appointment. Vacancies occurring from time to time in said commission shall be filled by the President of the United States.

SEC. 2. That the said commission shall report its work with its results and the deductions made therefrom, annually to the Secretary of the Interior, and its accounts shall be settled in the Interior Department, through such channels as the Secretary shall direct.

SEC. 3 That the members of said commission shall be entitled to mileage and other necessary expenses incurred in the prosecution of their duties, but no salaries as members of the commission.

SEC. 4. That the said commission is hereby authorized to appoint a principal expert who shall personally conduct the examinations and tests which the commission shall direct, with such assistants and laborers as may be necessary, and also to purchase such material for test and investigation as may from time to time be required.

SEC. 5 That this act shall take effect immediately.

The subject of Tests of Structural Materials was discussed by Messrs. Coffin, Dempster, Egleston, Michaelis, Richards and Welch.

The following nominating Committee was appointed in accordance with Section 24 of the By-Laws: D. J. Whittemore, of Milwaukee, Wis.; Albert Fink, of New York; A. Gottlieb, of Pittsburgh, Pa.; Charles H. Latrobe, of Baltimore, Md.; and Sandford Fleming, of Ottawa, Canada.

The death of Gen. John G. Barnard, Corps of Engineers, U. S. A., Honorary Member of the Society; elected member September 15th, 1869; elected Honorary Member April 7th, 1873; died May 14th, 1882, was announced.

The award of the Norman Medal for the past year was announced. The paper for which the medal is awarded is No. CCXXIII, published in Transactions, Vol. X, July, 1881. The subject of the paper is "The Re-enforcement of the Anchorage, and Renewal of the Suspended Superstructure of the Niagara Railroad Suspension Bridge." The author of the paper is Mr. L. L. Buck, M. A. S. C. E.

The report of the Committee on Standard Time was presented and read by the Chairman, Mr. Sandford Fleming, as follows:

The Special Committee on Standard Time beg leave to submit the following report:

At the Annual Meeting of the Society on the 18th January, last, resolutions were passed directing the Committee to take such steps as seemed to them advisable to obtain some expression of general opinion on the

important question of the establishment of Standard Time, with the view of submitting some definite recommendations as to the course it may seem expedient to take.

In accordance with these instructions the Committee issued the pamphlet herewith submitted, containing various documents bearing on the question. This *brochure* has been widely circulated, in every State of the Union, in the adjoining British provinces, and in Mexico. A series of questions prepared with the view of eliciting all shades of opinion were sent with the pamphlet, and attention to them at an early period was asked.

Replies have been received from many prominent men connected with the profession, with railways, with telegraphs, and with scientific bodies, and additional answers from the more distant parts of the continent are daily arriving.

The character of the replies received to date has been classified. The following synopsis may be presented along with each question:

Question 1.—Are you in favor of a comprehensive system of Standard Time for North America?

The replies to this question may be said to be unanimous. The opinion is emphatically expressed that there should be established, as early as possible, a comprehensive system of Standard Time for North America.

Question 2.—Do you favor the idea expressed in some of the documents referred to, of bringing the Standards of Time of all countries into agreement?

Ninety-five per cent. of the answers are in the affirmative; five per cent. in the negative.

Question 3.—In order to attain the object set forth in question No. 2, do you consider it advisable to secure a time system for this country which would commend itself to other nations, and be adopted by them ultimately?

Ninety-five per cent. of the answers are in the affirmative, and the opinion is frequently expressed that while we must primarily look to our own convenience on this continent, as we are likely to be the first to adopt a reformed time system, we should, from the first, make provision for its universal application. Five per cent. of the answers are adverse.

Question 4.—Referring to the scheme for regulating time (page 28 of pamphlet issued by the Society), does it seem to possess any features which generally commend themselves to your judgment?

About ninety-seven per cent. of the answers are in the affirmative—3 per cent. in the negative.

Question 5.—Do you favor the proposal to have the standards of time differing by intervals of one hour, thus reducing the number of standards for the whole of North America to four, viz.: Meridians Q, R, S and T? (See 18 to 21, pages 30 and 31.)

Seventy-six per cent. of the answers are in the affirmative—twenty-four per cent. adverse.

Question 6.—Do you favor the suggestion to reduce the number of standards in North America to two, say Meridians U. and R. ? (See 21.)

Six per cent. are favorable—ninety-four per cent. adverse.

Question 7.—Do you prefer having only one Continental Standard, say Meridian S, and having one uniform time throughout the whole of North America ? (See 21, page 31.)

Thirty-six per cent. are in the affirmative—Sixty-four per cent. in the negative.

Question 8.—If the scheme set forth in the document referred to (page 28) does not generally meet with your approval, is there any other scheme which you prefer ? Please explain your preference for the information of the Committee.

The scheme is very generally and cordially approved. Several suggestions are made which are entitled to great respect.

Question 9.—Referring to the suggestions under the heading "Division of the Day into Hours" (page 31) please indicate which of the three following plans you prefer.

(A) The alternative plan No. 1, with the hours numbered from 1 to 24 without interruption ?

Ninety-two per cent. are in favor of a notation of 1 to 24—eight per cent. are adverse.

(B) The alternative plan No. 2, with the forenoon hours numbered as at present and the afternoon hours lettered as described ?

Eleven per cent. are in favor—eighty-nine per cent. against this plan of notation.

(C) The present division into half days, known as forenoon and afternoon, each half day having the hours numbered identically from 1 to 12 ?

Thirty-three per cent. are in favor and sixty-seven per cent. against the present system of dividing the day into two sets of hours, numbered from one to 12 and known as A. M. and P. M.

Question 10.—In order to secure perfect uniformity and accuracy, do you favor the proposal to have Standard Time disseminated throughout the country by central authority controlled by government ? (Page 30.)

Ninety per cent. are in favor of the proposal, ten per cent. against. In the latter the view is generally expressed that on account of the vast extent of the country. there should be various central observatories, all operating in harmony and mutually assisting each other in the work of disseminating accurate time.

Question 11.—Have you any particular views on the question of Time Reform, not embraced in the questions and replies above given ? If so, please state them for the information and guidance of the Committee. (If necessary, on a separate sheet.)

A very small percentage take an unfavorable view or propose modifications of the scheme submitted. The large majority are decidedly in favor of reform without delay. Much valuable information has been brought out which the Committee recommend should be printed.

It will be seen from the character of the replies received that a remarkable unanimity of opinion prevails in every section of the country heard from.

The Committee feel warranted in reporting that judging from the replies received there is a strong general feeling in favor of establishing a comprehensive system of Standard Time on the basis of the scheme set forth in the papers submitted. That an emphatic opinion has been expressed in favor of having four main standard meridians for the continent, distinguished as Q, R, S and T, or by such geographical names as may hereafter be adopted, and that a large majority of opinions expressed are in favor of numbering the hours in each day from 1 to 24 consecutively.

The opinion has also been generally expressed that while our time system should be in harmony with that of other nations, the necessity for reform on this continent is so urgent that we should not wait for other nations to move in the matter. That we should, as soon as practicable, inaugurate a system, the primary object of which would be to meet our own requirements. But that in taking the initiative we should by all means adopt a system capable of extension to the whole globe, and that we should, to some extent, give other nations an opportunity of co-operating with us.

The Committee accordingly recommend that steps be taken to obtain the establishment of a zero meridian which would be common to all nations for reckoning time and longitude, and that concurrence with this measure be sought from as many nationalities as may be induced to assist in this determination.

That efforts be made to lead to the acceptance of this course on the other Continents to the fullest extent.

That failing in this effort the people of the Western Continent determine a zero meridian for their own use and guidance and especially with the view of establishing a system of Standard Time.

SANDFORD FLEMING,
Chairman of Committee.

WASHINGTON, 17 May, 1882.

The subject of Standard Time was discussed by Messrs. Egleston, Hilgard and Fleming.

On motion of Mr. J. B. Francis, past President A. S. C. E , the following resolution was adopted.

Resolved, That this meeting entirely concurs in the recommendations contained in the report submitted, and that the Committee be requested, and is hereby authorized to continue their efforts to effect the objects set forth, and also to petition the Congress of the United States to take the necessary steps to have a prime or zero meridian established.

The report of the Committee on the Preservation of Timber was then discussed by Messrs. Collingwood, Bogart, Egleston, Chanute, Andrews, Gottlieb, and on motion the subject of the Preservation of Forests was referred to the same Committee.

ADDITIONS TO

LIBRARY AND MUSEUM.

From F. H. Hamlin, Deputy Commissioner, Department of Public Works New York:

Contract and Specifications for furnishing materials and labor for building one Floating Swimming Bath.

Proposals for Estimates for furnishing Illuminating Gas for lighting the Public Markets, Armories, Buildings and Offices of the City of New York, for the period from January 1, 1881, to December 31, 1881.

Proposals for Estimates for furnishing the Gas or other Illuminating Material for, and Lighting, Extinguishing, Cleaning, Repairing and Maintaining the Public Lamps (and supplying gas, etc., for new lamps when required) on the Streets, Avenues, Piers, Parks and Places in the City of New York, for the period of one year, from May 1, 1881, to April 30, 1882.

Proposals for furnishing materials and performing work in the alteration of Essex Market.

Proposals for furnishing materials and performing work in the erection of portions of Fulton Market.

Proposals for furnishing materials and performing work in the alteration of Tompkins Market.

Proposals for Regulating and Paving with Granite-block Pavement, One Hundred and Eighth Street, from Third to Fifth Avenue.

Proposals for Regulating and Paving with Granite-block Pavement.

Proposals for Regulating and Paving with Macadamized Pavement, Fifth Avenue from the present crosswalk on the north side of Ninetieth Street, to a line five feet south of and parallel with the south curb of One Hundred and Tenth Street, except where heretofore paved, and paving the gutters and intersections with Belgian or Trap-block pavement, and laying crosswalks of Blue-stone, as indicated upon the map on file in Department of Public Works, which more specifically sets forth the exact nature and extent of all the abovework.

Proposals for Regulating and Paving with Macadamized Pavement.

Proposals for Regulating and Paving with Trap-block Pavement the roadway of Eighty-third Street, from the west crosswalk of Eighth Avenue to the pavement heretofore laid at the intersection of the Boulevard, and extending at the several intersecting avenues from a line five feet north of and parallel with the north curb of Eighty-third Street, and laying crosswalks of three courses of blue-stone on the east side of the Boulevard, and on both sides of the intersecting avenues, where not already laid across Eighty-third Street, within the lines of the sidewalks of said avenues and Boulevard, and parallel therewith; also laying crosswalks of two courses of Blue-stone at the intersecting avenues adjoining the above described pavements.

Proposals for Regulating and Paving with Trap-block Pavement.

Proposals for Estimates for Regulating and Grading One Hundred and Twelfth Street from the west curb line of Sixth Avenue to the east curb line of Seventh Avenue, and Setting Curb Stones and Flagging Sidewalks therein.

Proposals for Sewer in Fifteenth Street, between Irving Place and Fourth Avenue, from end of present Sewer in Fifteenth Street.

Proposals for Sewers in Front Street, between Broad Street and Old Slip, and in Coenties Slip, between Front and South Streets.

Proposals for Laying Croton Water Mains in 166th, 137th, 169th and 106th Street, in St. Ann's, Madison, Bergen and Third Avenue, and in Terrace Place and Delmonico Place.

Proposals for furnishing, delivering and laying a Forty-eight inch Cast-iron Con-

duit Pipe from Kensico to a point between Hartsdale and Scarsdale, Westchester County, New York.

Proposals for furnishing Cast-iron Water Pipes, Branch Pipes and Special Castings.

Proposals for furnishing and delivering Stop Cocks, Stop Cock Boxes and Hydrants.

From C. H. Swan, Boston, Mass.:

Reports of the Brooklyn Water Works. Vol. I, from 1860 to 1865 inclusive. Vol. II, from 1866 to 1871 inclusive.

Annual Reports of the Board of Commissioners of City Works for the years 1872 and 1873. Brooklyn.

Fifth Annual Report of the Boston Water Board. 1881. Boston.

Report of Select Committee on Water Works. Investigation of Cincinnati. 1873.

Twenty-fifth Annual Report of the Board of Water Commissioners of Detroit for the year 1876. Detroit. 1877.

Evansville Water Works. Report of the Expert on the Contract Trials of the Gaskill Compound Pumping Engine. February, 1881. Cincinnati.

Fifth Annual Report of the Water Commissioners of Fitchburg. Fitchburg. 1874.

Second Annual Report of the Watuppa Water Board of Fall River. Jan. 1, 1876. Fall River, Mass. 1876.

Report of the North Hudson Co. Water Commissioners on the Proposed New Water Works for Hoboken, Weehawken, West Hoboken, and Town of Union, N. J. Jersey City. 1873.

Jersey City Water Reports. 1851 and 1861, 1862–1871, inclusive. Jersey City.

Report of the Chief Engineer for 1871. Jersey City. 1872.

Final Report of the Water Commissioners of the City of Lawrence. Lawrence, Mass. 1876.

First and Third Annual Reports of the Lawrence Water Board for the years 1876 and 1878.

Louisville Water Co. Reports for the years 1871, 1872 and 1873. Louisville.

Annual Reports of the Water Commissioners of Lowell, Mass., for the years 1870, 1871, 1872, 1873, 1874, 1875, 1876 (two copies of 1876). Lowell.

First (two copies) and Third Annual Reports of the Public Water Board of Lynn, Mass., for the years 1872 and 1874.

First and Third Annual Reports of the Board of Water Commissioners of Manchester, N. H., for the years 1873 and 1874. Manchester.

Louisville Water Company. Reports from 1861 to 1871 inclusive. Louisville.

Newburgh Water Works. Annual Reports from 1867 to 1872 inclusive. Newburgh.

Providence Water Works. Report of the Chief Engineer. January, 1871. Providence.

Pawtucket Water Works. Fifth, Sixth and Seventh Quarterly Reports. June, September and December, 1878. Pawtucket, R. I.

The Pawtucket Water Question. Large Meeting at Armory Hall. From the Providence Journal, Feb. 28, 1876.

Providence Water Works. Blank Return Book.

Saint Louis Water Works. Reports of the Board of Water Commissioners from 1867 to 1876 inclusive. St. Louis.

Contracts and Specifications of St. Louis Water Works.

Philadelphia. Annual Reports of the Chief-Engineer of the Water Department for the years 1873, 1874 and 1875. Philadelphia.

Salem City Documents for 1871–72, 1872–73, 1873–74. Salem, Mass.

Proceedings had in Board of Supervisors and Reports of Engineer in the matter of furnishing Water Supplies for the City and County of San Francisco. San Francisco. 1875.

Reports of the Board of Water Commissioners of the City of Springfield to the City Council for 1875 and 1876. Springfield, Mass.

Third Annual Report of the Board of Water Commissioners of the City of Yonkers. Dec., 1875. New York. 1876.

The Differentiating Waste Water Meter. Liverpool. G. F. Deacon, patentee.

Report of the American Scientific Commission on the Artificial Water Ways of Europe, with special reference to the Tehuantepec Railway and Ship Canal. October 16, 1871. London.

Borough of Liverpool. Waste Water Meter. Report of F. J. Bramwell, C. E. F. R. S. Liverpool. 1874.

Town of Westborough. Report of a Committee chosen by the town, May 15, 1872, to make investigations with Reference to the Feasibility and Cost of Obtaining a Supply of Pure Water for said town. Providence. 1873.

Reports of the Boston Harbor Commissioners. Vol. I and II, 1859 to 1865 inclusive. Boston.

Petitions for damages for the Diversion of Sudbury River by the City of Boston. Boston. 1876.

Report upon the Improvement of Roger Williams Park, by the Joint Committee on Parks, with Report of H. W. S. Cleveland. October, 1878. Providence, R. I. 1878. (2 copies.)

Thirteenth Annual Report of the Brooklyn Park Commissioners. Brooklyn. 1873.

Annual Report of the State Geologist of New Jersey for the year 1876. Trenton. 1876.

Reports of the Board of Road Commissioners, City Surveyor and City Inspector of New Haven Conn. Year 1875. New Haven. 1876.

Census of Rhode Island. June 1, 1875. Part II. Tables.

An Address at the Dedication of Pardee Hall, Lafayette College, October, 1873, by R. W. Raymond, Ph. D. Easton, Pa. 1873.

Mouth of the Mississippi. The Jetty System Explained. By James B. Eads. St. Louis. 1874.

Report of the Commission of Engineers appointed to Investigate and Report a Permanent Plan for the Reclamation of the Alluvial Basin of the Mississippi River Subject to Inundation. Washington. 1875.

Reports upon the Specimens obtained from Borings made in 1874, between the Mississippi River and Lake Borgne, at the site proposed for an outlet for flood waters, by Prof. E. W. Hilgard and Dr. F. V. Hopkins. Washington. 1878.

Handbuch der Wasserbaukunst, von G. Hagen. Band I and II and Plates. Berlin. 1869 and 1870.

The Haidah Indians of Queen Charlotte's Islands, B. C, with a brief description of their Carvings, Tattoo Designs, etc., by James G. Swan. Wash. City. 1874.

Boston Water Reports. 2 volumes. Vol. 1, 1845 to 1861 inclusive. Vol. II, 1862 to 1871 inclusive.

Boston. Reports of the Cochituate Water Board to the Council of Boston, for the years ending April 30, 1872, 1873, 1874, 1877, 1878.

Communication from the Cochituate Water Board in regard to the High Service District, and a Report from the City Engineer on same subject.

Sixth Annual Report of the Lowell Water Board, January 13, 1879. Lowell, Mass. 1879.

Second Annual Report of the Lawrence Water Board. Lawrence. 1878.

Borough of Liverpool Waste Water Meter, recently patented by the Engineer. Report of F. J. Bramwell, C. E. Liverpool. 1874.

The Differentiating Waste Water Meter. (Deacon's Patent.) Liverpool.

The Eighth, Ninth, Tenth and Eleventh Annual Report of the Mystic Water Board, for the years ending Dec. 31, 1872, 1873, and from Jan. 1, 1874 to April 30, 1875, also from May 1, 1875, to May 1, 1876.

Salem Water Reports. 2 vols. Vol. I, from 1863 to 1867 inclusive. Vol. II, from 1868 to 1870.

Water Reports. Charleston, Cambridge, Lowell and Philadelphia. 1867-1872.

Specifications of the Charleston, Lowell, and New Bedford Water Works.

Appareil et Construction des Ponts Biais, par M. Graeff. Text, Paris. 1867.

Die Correction des Rheins von Basel bis zur Crosh. Hessischen Creutz. Denkschuft. 1862.

Karten über die Binnenflüsse im Grosk erzogthum Baden nach dem Stande, vom jahr. 1865.

Karte über der Lauf des Rheins lange der Badisch-Französeschen Crenze nach dem Stande der jahre 1838 und 1861, und lange der Badisch-Bayerischen Crenze nach dem Stande der jahre 1817 und 1861.

Der Binnenfluss Bau im Grosherzogthum Baden. Bearbeitet. 1865.

Der Reein und dessen technische Behandlung langs der Badisch-Französischen Grenze. Von Basel bis Lauterburg. Kailsruhe. 1855.

Experiences Hydraulics. Vol. 1, Text Vol. II Atlas by Poncelet Lesbros.

From John C. Trautwine, Philadelphia:

A Book of Architecture containing designs of buildings and ornaments. James Gibbs. London. 1728.

Wood's American Portfolio of original Philadelphia designs for Iron Railings, Verandahs, Statuary, Monuments, &c, Philadelphia. 1851.

A Theoretical and Practical Treatise on the Construction of Bridges in Stone, Iron and Wood, &c. George Duggan. Parts I to VII. New York. 1850.

Plans and Sections of the Obelisk on Bunker's Hill. S. Willard. Boston. 1843.

A Description of Tremont House with Architectural Illustrations. Boston. 1830.

Report of the Surveyor-General of Prisons on the Construction, Ventilation and details of Pentonville Prison, 1844. London. 1844.

Description of Col. S. H. Long's Bridges, together with a series of directions to Bridge Builders. Stephen H. Long. Philadelphia. 1841

Illustrations of Pile Driving. London. 1787.

Report of the Final Location and Probable Cost of the Cincinnati, Hillsburgh and Parkersburgh Railroad. Ellwood Morris. Cincinnati. 1853.

Third Annual Report of Hiwassee Railroad, and Report of Chief Engineer. Athens, Tenn. 1839.

Honduras Interoceanic Railway. Preliminary Report. E. G. Squier. New York. 1854.

Honduras Interoceanic Railway, with Maps of the Line and Ports and Appendix. E. G. Squier. London. 1857. (2 copies.)

Reports on Supplying Boston with Pure Water. By Loammi Baldwin, Esq. Boston. 1834, 1st Edition. 1835, 2d Edition.

Proceedings before a joint Special Committee of the Massachusetts Legislature, upon the Petition of the City of Boston for leave to introduce a supply of Pure Water into that City from Long Pond. Boston. 1845.

Public Works in the United States of America. Edited by William Strickland. Ed. H. Gill. Henry R. Campbell. Text and Atlas. London. 1851.

Some Remarks on the Internal Improvement of the South. John C. Trautwine. Philadelphia. 1839.

Remarks on the Canal or "Dique" of Carthagen, New Grenada, and its Navigation by Steam. New York. 1855.

Reports upon Specimens obtained from Borings made in 1874, between the Mississippi River and Lake Borgne. Eugene W. Hilgard and Dr. F. V. Hopkins. Washington. 1878.

Reports on the means of improving the present Harbor and the Construction of Docks at Montreal. Hon. John Young. Montreal. 1859.

Translation of Notes Accompanying Drawings concerning the Constructon of Iron Lock-Gates for the Harbors of the Weser River, Germany. Gen. G. Weitzel, U. S. A. Washington, D. C. 1873.

Recreations in Mathematics and Natural Philosophy. Charles Hutton, L L D., F.R. S. In 4 volumes. London 1803.

Journal of the Expedition of Inquiry for the Junction of the Atlantic and Pacific Oceans L. Gisborne. With 4 Maps. Philadelphia. 1854.

On the connection of Geology with Terrestrial Magnetism. Evan Hopkins, C. E., F. T. G. S. London. 1844.

Practical Tables in Meteorology and Hypsometry, with Appendix to the Paper on the use of the Barometer in Surveys, &c. R. S. Williamson. New York. 1868.

Catalogue of Saw-Machines and Wood-Working Machinery. Vienna Exposition. 1873. Philadelphia Exposition. 1876.

Northwest Territory. Reports on the Assiniboine and Saskatchewan Exploring Expedition. By Henry Y. Hind, M.A. Toronto. 1859.

Recherches Experimentales sui les Claux de Construction les Bétons et les Mortiers ordinaries. L. J. Vicat. Paris. 1818

The Civil Engineer's Pocket Book. John C. Trautwine, C. E. Philadelphia. 1881.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
BUDGE, ENRIQUE	Valparaiso, Chili	Feb. 1, 1882.
GORDON, ROBERT	Henzada, British Burma	Feb. 1, 1882.
KINNEY, EDWARD C	Chief Engineer St. Louis, Des Moines and Northern R. R., Des Moines, Iowa	May 3, 1882.
LINDENTHAL, GUSTAV	Civil Engineer Monongahela Bridge, Pittsburgh, Pa	May 3, 1882.
MCCOLLOM, THOMAS C	Civil Engineer U. S. N., New London, Ct.	May 3, 1882.
PERKINS, CHARLES P	(Elected Junior Feb. 3, 1875), Engineer P. & E. Div. P. R. R., and S. S. E. & C. Div. North Cent. Ry., Williamsport, Pa	April 5, 1882.
RANDOLPH, JAMES L	Chief Engineer Baltimore & Ohio R. R., Camden Station, Baltimore, Md	Mch. 1, 1882.
REEVES, DAVID	(Elected Junior April 1, 1874), Pres. Phœnix Iron Co., 410 Walnut Street, Philadelphia, Pa	May 3, 1882.
RHODES, BENJAMIN	Niagara Falls, N. Y.	April 5, 1882.

CHANGES AND CORRECTIONS.

MEMBERS.

BECKWITH, ARTHUR.....Tribune Building, Room 75, New York City, N. Y.

BECKWITH, LEONARD F..Tribune Building, Room 75, New York City, N. Y.

BRECKINRIDGE, CABELL.Chief Engineer Alabama Gt. Southern R. R. Tuskaloosa, Ala.

BUCK, L. L .....124 Bedford Avenue, Brooklyn, N. Y.

CHITTENDEN, S. H.....East River, Conn.

CORTHELL, E. L.....Chief Engineer N. Y. W. S. & B. R. R., Mills Building, 15 Broad Street, New York City, N. Y.

CROSBY, WILSON.....Room 145, Temple Court, 5 Beekman Street, New York City, N. Y.

DAVIS, JOSEPH P.....144 Greenwich St., New York City, N. Y.

DURHAM, C. W.....19 Fifth Avenue, New York City, N. Y.

GOLAY, PHILIP.....U. S. Asst. Engineer, Paducah, Ky.

HARDING, HENRY.....Salem, Mass.

HARRIS, ROBERT L.....Care Dr. David Kimball, Portsmouth. N. H.

HUGHES, WILLIAM M...Engineer of Bridges, N. Y. C. & St. L. Ry., Hoyt Block, Cleveland, Ohio.

KATTÉ, WALTER.....Chief Engineer N. Y., Ont. & W. Ry., and N. Y., W. S. and B. R. R., Mills Building, 15 Broad Street, New York City, N. Y.
LOTZ, WILLIAM H.....57 Metropolitan Block, Chicago, Ill.
MASTEN, C. S..... Div. Eng. W., St. L. & P. R. R., St. Louis, Mo.
MAXWELL, JAMES R.....Chief Eng. and Supt. Cons. D. O. & O. R. Ry., Olney, Ill,
MONROE, J. ALBERT....Div. Eng. N. Y., W. S. & B. R. R., Kingston, N. Y.
MOORE, CHARLES E.....Asst. Eng. W., St. L. & P. R. R., St. Louis, Mo.
MORRIS, MARSHALL.....Chief Eng. C. & I. Div. L. N. A. & C. Ry., 530 W. Walnut Street, Louisville, Ky.
NICHOLS, O. F.....Res. Eng. Henderson Bridge Co., Henderson, Ky.
PAINE, CHARLES.....Gen. Mang. N. Y., W. S. & B. R. R., Mills Building, 15 Broad Street, New York City, N. Y.
PICKETT, WILLIAM D...Fort Washakie, Wyoming.
ROTCH, WILLIAM.....Treasurer Connotton Valley Ry., 13 Exchange Street, Boston, Mass.
SANDERSON, J. GARDNER.Tribune Building, Room 77, New York City, N. Y.
SEARS, CLINTON B.....Capt. Corps of Engineers U. S. A., Executive Officer Mississippi River Com., 2828 Washington Avenue, St. Louis, Mo.
SEYMOUR, HORATIO, JR..Marquette, Mich.
TINTORER Y GIBERGA, JOSÉ.Asalto No. 12, Barcelona, Spain.
WELLINGTON, ARTHUR M.Asst. Gen. Mang. Mexican Cent. R. R., No. 5 Plazuela de San Fernando, Mexico, Mex.
WURTELE, A. S. C.....Asst. Eng. N. Y. C. & H. R. R. R., 60 Chestnut Street, Albany, N. Y.

JUNIORS.

EMONTS, WM. A. G.....Sunbury Northumberland County, Pa.
HORTON, SANDFORD....Peekskill, N. Y.
LAFON, THOMAS.....Sub. Div. Eng. Mex. Nat. Cons. Co., Manzanilla, Mexico.
LUCAS, D. JONES.....Lowellville, Mahoning Co., Ohio.

DEATHS.

BARNARD, JOHN G.....Elected Member Sept. 15, 1869; elected Honorary Member April 7, 1873; died April 14, 1882.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—June, 1882.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

JUNE 7TH, 1882.—The Society met at 8 P. M. President Welch in the Chair. Ballots for membership were canvassed and the following candidates declared elected as Members: Thomas Doane, Charlestown, Mass.; Leon Joseph Fremaux, New Orleans, La.; Edmund Le Breton Gardiner, Passaic, N. J.; Edward Henry Keating, Halifax, N. S.; John Francis Le Baron, Jacksonville, Fla.; Augustus Woodbury Locke, North Adams, Mass.; Howard Schuyler, Mexico, Mexico; as Associates: Thomas Walter Nicol, Forlorn Hope, La.; Ashbel Welch, Jr., Lambertville, N. J.; as Juniors: John Ripley Freeman, Lawrence, Mass.; William Bronard Mackenzie, Moncton, N. B.; William Barclay Parsons, New York City, N. Y.; Alfred Rosenweig, Mexico, Mexico.

A paper by James Owen, Member A. S. C. E., subject, Highway Bridges, was read by the author and discussed by Messrs. Corthell, G. S. Greene, Jr. and Ashbel Welch.

OF THE BOARD OF DIRECTION.

MAY 3D, 1882.—Applications were considered. The purchase and receipt of the professional library of the late James P. Kirkwood was

reported. Arrangements were made for the annual Convention. Appropriations were made.

JUNE 6TH, 1882.—Applications were considered. Appropriations were made. It was determined that a meeting of the Society should be held on July 5th, and that thereafter the meetings should be suspended until the first Wednesday in September. A communication from the Committee on Standard Time was considered and action taken.

CONTRIBUTIONS TO THE BUILDING FUND.

By a resolution of the Board of Direction, all contributions to the Building Fund are to be acknowledged, from time to time, by printing lists of the same in the monthly Proceedings of the Society, and in addition to this the names of all those who may subscribe $100 or more are to be regularly enrolled and published in future lists of the Society under the head of Subscribers to the Building Fund, and they will be entitled to receive one copy of the monthly publications, comprising all papers and transactions of the Society, regularly, for life, for each $100 subscribed by them ; such copies to be in addition to those which they may be already entitled to if they are Members or Fellows :

The following contributions are acknowledged in addition to those heretofore noted :

Robert Ballard	$100 00
Charles R. Boyd	100 00

ADDITIONS TO

LIBRARY AND MUSEUM.

From Gen. Adna Anderson, St. Paul, Minn. :

Military Railroads, 1861-67. General Orders, Instructions and Reports.

From James P. Bogart, New Haven, Conn. :

Sixteenth Annual Report of the Fish Commissioners, and First Report of the State Shell Fish Commissioners. Hartford. 1881.

From Charles O. Brown, New York :

A set of Maps of United States of Colombia.

From Francis Collingwood, New York :

Specifications for Certain Steel Work required for the Completion of the Suspended Superstructure of the East River Bridge. 1881.

From J. James R. Croes, New York :

Graphic History of Introduction of Water in Bridgeton, N. J. Dec. 24, 1877.

First, Second and Third Annual Reports of the Water Committee of Bridgeton, N. J., for the years 1878-79-80.

From James B. Eads, St. Louis :

Letter of Sir Edward J. Reed, K. C. B., to Rear Admiral Ammen, U. S. N., on Ship Railways and Canals on the American Isthmus. (*Copies for distribution.*)

From W. W. Evans, New York :

Letter of W. W. Evans, Civil Engineer, on Plan of Bulkheads and Docks for the City of New York. New York. 1881.

From G. Clinton Gardner, Greenfield, Mass. :

Answer to some of the Objections made against the Memorial of the Troy and Greenfield Railroad Company. Boston. 1857.

Value of the Stock and Bonds of the Troy and Greenfield Railroad. Greenfield. 1856.

An Address to the Stockholders of the Troy and Greenfield Railroad Company. O. Clapp. Boston. 1855.
Memorial of the Western Railroad Corporation. Boston. 1854.
Speech of Hon. H. G. Parker, of Greenfield, in the Massachusetts House of Representatives. 1854.
By-Laws and Acts of Incorporation of the Troy and Greenfield Railroad Company.
A brief Report of the Hoosac Tunnel. Boston. 1854.
Reasons Why Boston should Aid in the Construction of the Hoosac Tunnel. Boston. 1860.
Report on the Memorial of the Troy and Greenfield Railroad Company. Boston. 1861.
Report of the Committee of Investigation on the Hoosac Tunnel Loan. Greenfield. 1860.
General Laws and Resolves passed by the Legislature of Massachusetts during the Sessions of 1867 and 1869.
Final Settlement of the Claim of H. Haupt & Co. against the State of Massachusetts. H. Haupt. Boston. 1869.
Report of the Treasurer and Receiver-General of the Commonwealth of Massachusetts. Boston. 1869.
Report of the Troy and Greenfield Railroad and Hoosac Tunnel. B. H. Latrobe. Boston. 1869.
Valedictory Address of Alexander H. Bullock, to the Legislature of Massachusetts. Boston. 1866. 1869.
Truths about the Hoosac Tunnel Projects. Boston. 1851.
Cost of the Tunnel of the Troy and Greenfield Railroad.
Closing Argument of H. Haupt in behalf of the Troy and Greenfield Railroad Company. Boston. 1862.
The Hoosac Tunnel and the Troy and Greenfield Railroad. 1862.
The Decline and Fall of the Hoosac Tunnel. F. W. Bird. Boston. 1862.
Report Relative to Conveyances of the Southern Vermont Railroad. 1862.
Speech of Hon. Whiting Griswold on the Bill Concerning the Troy and Greenfield Railroad. Boston. 1862.
The Condition and Prospects of the Hoosac Tunnel. F. W. Bird. Boston. 1865.
Report of the Troy and Greenfield Railroad. Boston. 1865, 1867, 1869.
Statement of H. Haupt to the Joint Special Committee on Troy and Greenfield Railroad and Hoosac Tunnel. 1864.
Argument of Hon. D. S. Richardson on the Troy and Greenfield Railroad. Boston. 1863.
Report of the Arguments on the subject of the Troy and Greenfield Railroad and Hoosac Tunnel. Boston. 1863.
Speech of Wm. D. Swan concerning the Troy and Greenfield Railroad. Boston. 1862.
Report of the Commissioners of the Troy and Greenfield Railroad and Hoosac Tunnel. Boston. 1869.
Report of the Water Commissioners of the City of Lawrence. Lawrence, Mass. 1871, 1872. 1873, 1875, 1876.
Rejected papers in relation to the Hoosac Tunnel. Boston, 1868.
Report of the Hon. A. Crocker upon the Work of the Troy and Greenfield Railroad and Hoosac Tunnel. Boston. 1868.
Report of the Commissioners of the Department of Parks of Boston. Boston. 1876.
Boston in the Future. Its Park Grounds and a Grand Avenue. Boston. 1871.
Proceedings of a Public Meeting held at Faneuil Hall, Boston. Boston. 1876.
Report of the Water Commissioners of Brooklyn. Brooklyn. 1879.
Annual Report of the City Engineer of Boston. Boston. 1878 and 1879.
Map and Description of the proposed Metropolitan Park for Boston. Boston. 1870.
Essay and Plan for the Improvement of Boston. R. M. Copeland Boston. 1872.
Facts and Figures concerning the Hoosac Tunnel. J. J. Piper. Fitchburg. 1866.
The Hoosac Tunnel Route compared with the Western Railroad. A. R. Field. Lowell, Mass. 1866.
Annual Report of the Cochituate Water Board. Boston. 1861 to 1864 and 1867.
Lawrence Water Works :
Contract and Specifications for a Distributing Reservoir. 1873. (2 copies.)
Contract and Specifications for Furnishing Stone. 1874. (2 copies.)
Contract and Specifications for Laying Water Pipe. 1874. (2 copies.)
Contract and Specifications for Furnishing Water Pipes and Special Castings. 1874, (2 copies.)
Appleton's Mechanics' Magazine and Engineering Journal. Nos. 1 to 9, inclusive.
The Practical Mechanic's Journal. Part XVIII. September, 1849.
Acts Granting Aid to the Troy and Greenfield Railroad, that a committee of five be appointed to inquire what payments have been fully complied with. January 30, 1860.
Report of the Committee on Hoosac Tunnel, Troy and Greenfield Railroad. March 20, 1879.
An Act Authorizing a Loan of the State Credit to enable the Troy and Greenfield Railroad Company to Construct the Hoosac Tunnel.
The Legislature of 1868 authorizing the Governor and Council to make a Contract for the Completion of the Hoosac Tunnel.
Statements of Payments on account of the Troy and Greenfield Railroad and Hoosac Tunnel.
Report of Joint Special Committee on the Troy and Greenfield Railroad and Hoosac Tunnel, to whom was referred so much of the Governor's address as relates to that subject. April 17, 1865.
Report of Messrs. J. W. Brooks, Samuel M. Felton and Alex. Holmes, Commissioners appointed under chapter 156 of the Acts of 1862, providing for the more speedy completion of the Troy and Greenfield Railroad and Hoosac Tunnel. January 14, 1865.
Report to the House what amount of money has been paid on account of the Hoosac Tunnel during last year. February 1, 1864.
Report of the Committee on Finance, to whom was referred the bill to incorporate the Boston and Northwestern Railroad Company. May 5, 1873.
An Act to provide for the Consolidation of the Hoosac Tunnel line of railroads from Boston to Troy. April 23, 1873.
Report of the Committee on the Troy and Greenfield Railroad and Hoosac Tunnel who were ordered to inquire into the cause of the disaster involving the loss of so much life and property. May 19, 1868.

Report of the Committee of the Troy and Greenfield Railroad to whom was referred the memorial of Herman Haupt & Co. April 30, 1868.

Report of the Committee on Finance to provide for funding the unfunded debt created in the construction of the Troy and Greenfield Railroad Company and the Hoosac Tunnel.

Reply to the communication of J. W. Brooks on a surface railroad over the Hoosac Mountain. May 7, 1866.

Report of the Committee on the Hoosac Tunnel, Troy and Greenfield Railroad to whom was referred the memorial of Herman Haupt. April 2, 1866.

Report on the Troy and Greenfield Railroad and Hoosac Tunnel by the Joint Special Committee of 1865. Boston, 1866.

Report of the Committee on the Treasury to whom was referred the House Resolve appropriating the sum of $53 000 00 to H. Haupt & Co. June 4, 1868.

An act authorizing a Loan of the State Credit to enable the Troy and Greenfield Railroad to construct the Hoosac Tunnel. February 18, 1859.

Report of the Joint Standing Committee on Railways and Canals to whom was referred the petition of the Troy and Greenfield Railroad Company. February 11, 1859.

Address of Nathaniel P. Banks to the Legislature of Massachusetts. Boston. 1859.

Third Annual Report of the Troy and Greenfield Railroad Company.

Report of the Work upon the Troy and Greenfield Railroad and Hoosac Tunnel. Hon. A. Crocker. Boston. 1866. (2 copies.)

An act in further addition to an act providing for the more speedy completion of the Troy and Greenfield Railroad and Hoosac Tunnel. April 17, 1867.

Commissioners' report on the speedy completion of the Troy and Greenfield Railroad and Hoosac Tunnel. January 10, 1866.

An act authorizing a loan of the State Credit to enable the Troy and Greenfield Railroad Company to construct the Hoosac Tunnel. March 5, 1859.

Report of the Joint Special Committee to whom was referred the petition of the Troy and Greenfield Railroad Company. April 12, 1856.

Petition of the Troy and Greenfield Railroad. April, 1854.

An act authorizing the City of Boston to subscribe to the Capital Stock of the Troy and Greenfield Railroad Company.

Report of the Special Committee relating to payments made to the Troy and Greenfield Railroad Company under several acts granting State aid to said company.

Memorial to the Senate and House of Representatives of the State of Massachusetts.

Report of the Joint Special Committee to whom was referred so much of the Governor's address as relates to the Troy and Greenfield Railroad. April 4, 1863.

Report of the Commissioners of the Troy and Greenfield Railroad relative to the progress and condition of the work.

Report of Committee on Finance to whom was referred the resolve in favor of Herman Haupt & Co.

Message of the Governor to the House of Representatives of Massachusetts, relating to an act authorizing a loan of the State Credit to enable the Troy and Greenfield Railroad to construct the Hoosac Tunnel. May 26, 1857.

Report of the Committee on Finance to whom was referred the Bill to permit the establishment of a Union Freight Depot at Greenfield. May 10, 1878.

General statement of the Summary of the Financial Transactions of the year (1868), from the report of the Auditor. Boston. January 15, 1869.

Report of the Joint Standing Committee of 1867 on the Hoosac Tunnel and the Troy and Greenfield Railroad Company.

An act to authorize the Governor and Council to expend a sum not exceeding $300 000 00 for constructing archways in the Hoosac Tunnel, and for other purposes. 1874.

Address of John A. Andrew to the Legislature of Massachusetts. Boston. 1864.

From Wm. Paul Gerhard, Newport, R. I.:

Diagrams for Sewer Calculations. Wm. Paul Gerhard. New York. 1881.

From James H. Harlow, Pittsburgh:

Forty-second Annual Report of Monongahela Navigation Co. Jan. 12, 1882.

From R. Hering, Philadelphia:

Report of the results of an examination made in 1880 of several sewerage works in Europe. R. Hering.

From Keystone Bridge Co., Pittsburgh:

Album of Structures built by the Keystone Bridge Co.

From Wm. J. McAlpine, New York:

A Treatise on Practical Surveying. Robert Gibson. Philadelphia. 1803.

From Isaac Newton, Chief Engineer Department Public Works, New York:

Report on Water Supply for City of New York. (*Copies for distribution.*)

From M. E. Pontzen, Paris, France:

Notice descriptive des Appareils Electriques Exposès par la Compagnie du Chemin de fer du Nord.

From J. Harsen Rhodes, New York:

A Treatise on the Calculus of Variations. Lewis Buffet Caill, A. M. New York. 1881.

From A. A. Robinson, Topeka, Kansas:

Annual Report of the Board of Directors of Atchison, Topeka and Santa Fè Railroad, year ending Dec. 31, 1880.

From T. Guilford Smith, Buffalo, N. Y.:

Eighth, Ninth, Tenth and Eleventh Reports of the Buffalo Park Commission. August, 1881.

From N. J. Welton, Waterbury, Conn.:

Annual Report of Treasurer and Auditor, and Fifth Annual Report of the Water Commissioners of the City of Waterbury, year ending January 6, 1873.

From George P. Wescott, Portland, Me.:

Report. Rates, Rules and Regulation, with a Sketch of the History of the Portland Water Co. Portland. 1881.

From Thomas J. Whitman, St. Louis.

Annual Report of the Board of Public Improvement. St. Louis. 1881.

From Gen. H. G. Wright, Chief of Engineers, Washington:

Reports as to additional works that are required to properly complete the improvement of the Saint Mary's River and Saint Mary's Falls Canal, Michigan, with an estimate of the cost of the same.

Annual Report of the Joint Commission for the completion of the Washington Monument. 1881.

Report of Captain William Ludlow, Corps of Engineers upon an examination of Frankford Creek, from its mouth in the Delaware River to Frankford Avenue.

Reports of Capt. C. J. Allen, Corps of Engineers upon examinations of Beaver Bay, Grand Portage Bay, and Waus-wau-goning Bay. Minnesota.

Report of a practical resurvey of the Susquehanna River, near Havre de Grace, Md., and containing an estimate for the continuation of the improvement in that locality. 1882.

Report of Lieut.-Col. G. K. Warren upon a survey of Eagartown Harbor and South Beach, Mass. 1882.

Report of Col. John Newton, with accompanying map, upon the completion of the Survey of Harlem River, New York, and through Harlem Kills to the East River, New York. 1881.

Report of Lieut.-Col. Q. A. Gillmore upon a survey made for the further improvements necessary in Savannah River and Harbor. 1882.

Report of Capt. O. H. Ernst upon a survey of Bish Bend in the Mississippi River, near Fort Chartres. 1882.

Reports of Maj. J. W. Barlow upon surveys made of Harbor of Madison, Connecticut; Harbor of Clinton, Connecticut; Greenpoint Harbor, N. Y.; Harbor of Mamaroneck, N. Y., for a breakwater and harbor of refuge at Milford, Conn. 1882.

Report upon the dredging of an ice harbor at Dubuque, Iowa. 1882.

Report of Capt. Thomas Turtle of surveys across the Peninsula of Maryland and Delaware, to connect by canal the waters of the Delaware and Chesapeake Bays. 1882.

Report of Lieut.-Col. G. K. Warren upon examinations and surveys of Buzzard's and Barnstable Bays, Mass. 1882.

Information in relation to the Government, Works on the Fox and Wiscon sin Rivers improvement at Mensha and Appleton, Wis.

Report of Maj. J. W. Cuyler upon an examination of Licking River, from its mouth to Falmouth, Ky.

Estimates of amounts required to supply deficiencies in the appropriations for buildings and grounds in this City for the current fiscal year.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
Bixby, William H.	Lieut. of Engineers, U. S. A. (Care C. L. Bixby), 10 India St., Boston, Mass.	April 5, 1882.
Curtis, William G.	Supt. of Track, Central Pacific R.R., San Francisco, Cal.	May 3, 1882.
Doane, Thomas	Consulting Engineer, Charlestown, Mass.	June 7, 1882.
Gardiner, Edmund Le B.	Engineer Dundee Water Power and Land Co., Passaic, N. J.	June 7, 1882.
Keating, Edward H.	City Engineer, Halifax, N. S.	June 7, 1882.

ASSOCIATE.

Welch, Ashbel, Jr.	Prop'r Lambertville Iron Works, Lambertville, N. J.	June 7, 1882.

JUNIOR.

Freeman, John R.	Prin. Ass't Engineer Essex Water Power Co., Lawrence, Mass.	June 7, 1882.

CHANGES AND CORRECTIONS.

MEMBERS.

CROSBY, WILSON.....115 Broadway, Room 141, New York City, N. Y.
DAVIS, CHESTER B... .Superintendent Water Works, Madison, Wis.
LOVETT, THOMAS D.....Consulting Engineer, 49 West Third Street, Cincinnati, Ohio.
PALMER, FRANCIS I.....(Care G. I. Whitehead), 206 Broadway, New York City, N. Y.
PARKHURST, HENRY W..Care S. C. & P. R.R., Missouri Valley, Iowa.
SCHMIDT, MAX E.....5 Congress Street, Chicago, Ill.

JUNIOR.

HAVILAND, ARTHUR.....(Care Am. Soc. C. E.), 127 East Twenty-third Street, New York City, N. Y.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—July, 1882.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

JUNE 21ST, 1882.—The Society met at 8 P. M., President WELCH in the chair. A paper by O. Chanute, Member A. S. C. E., subject: Uniformity in Rolling Stock, was read by the Secretary, and discussed by Messrs. Compton, Cooper, Emery, Forney, William H. Paine and Welch.

JULY 5TH, 1882.—The Society met at 8 P. M., President WELCH in the chair. Ballots for membership were canvassed and the following candidates declared elected: as Members—Peter C. Asserson, Norfolk, Va.; Edward Cook Burns, Detroit, Mich.; David Dexter Clark, New Tacoma, Washington Ter.; William Hooper Dennis, Washington, D. C.; William Ludlow, Corps of Engineers, U. S. A.; M. William Mansfield, Zanesville, Ohio; William Abbott Pratt, Connellsville, Pa.; Nathaniel Chapin Ray, Sugar Loaf, Colorado; William Starke Rosecrans, San Francisco, Cal.; William Harrison Smith, Oneida, N. Y.; as Junior—Frederic Nicholas Blanc, New York, N. Y.

The death was announced of Ira E. Clark, Junior Member of the Society; elected February 6, 1878, Died May 23, 1882.

The Secretary announced that the act recently passed by Congress making appropriations for the Support of the Army, approved June 30, 1882, contained the following clause: "United States Testing Machine.—For caring for, preserving, using and operating the United States testing machine at the Watertown Arsenal, ten thousand dollars; *Provided*, That the tests of iron and steel, and other materials for indus-

trial purposes, shall be continued during the next fiscal year, and report thereof shall be made to Congress; *And provided further*, That in making tests for private citizens, the officer in charge may require payment in advance, and may use the funds so received in making such private tests, making full report thereof to the Chief of Ordnance; and the Chief of Ordnance shall give attention to such programme of tests as may be submitted by the American Society of Civil Engineers, and the record of such tests shall be furnished said society to be by them published at their own expense."

A paper by S. S. Haight, Member A. S. C. E., subject: Accuracy of Measurement as Increased by Repetition, was read by the author and discussed.

OF THE BOARD OF DIRECTION.

JUNE 23D, 1882.—An Ordinance passed by the Councils and approved by the Mayor of the City of Philadelphia was considered. This Ordinance requests the American Society of Civil Engineers, conjointly with the Franklin Institute, to nominate to the Mayor of Philadelphia the names of nine Engineers. From these the Mayor is requested to select three to act, in conjunction with the Chief Engineer of the Water Department, as a Board of Experts in reference to the water supply of that city.

The Secretary was requested to confer with the officers of the Franklin Institute on this subject.

JULY 6TH, 1882.—Applications were considered. The Secretary reported an interview with the President of the Franklin Institute in reference to the ordinance of the Councils of the city of Philadelphia requesting the nomination of Engineers.

The Secretary was directed to ask, by circular letter, the opinion of the Members of the Society whether it would be expedient and advisable that the Board of Direction of the American Society of Civil Engineers should comply with requests to nominate Engineers from whom may be selected members of advisory professional boards. The Secretary was requested to accompany the circular letter with a statement of suggestions on each side of this question.

The Secretary presented a copy of the clause from the Army Appropriation Bill referring to this Society. [See Minutes of Society, July 5, 1882, above.] The President and Secretary were requested to invite, by correspondence, suggestions as to the method of preparing such programme of tests.

CONTRIBUTIONS TO THE BUILDING FUND.

By a resolution of the Board of Direction, all contributions to the Building Fund are to be acknowledged, from time to time, by printing lists of the same in the monthly Proceedings of the Society, and in addition to this the names of all those who may subscribe $100 or more are to be regularly enrolled and published in future lists of the Society under the head of Subscribers to the Building Fund, and they will be entitled to receive one copy of the monthly publications, comprising all papers and transactions of the Society, regularly, for life, for each $100 subscribed by them; such copies to be in addition to those which they may be already entitled to if they are Members or Fellows:

The following contributions are acknowledged in addition to those heretofore noted:

R. S. Hayes..... $100 00

MEMOIRS OF DECEASED MEMBERS.

CHRISTIAN PHILIPP MAX MARIA, BARON VON WEBER, Hon. Member A. S. C. E.

DIED APRIL 18TH, 1881.

Baron von Weber, the only son of the great composer, was born in Dresden in 1822. After a classical training he was educated specially for the profession of Engineering at the Polytechnic School in Dresden. He was directly afterwards connected, first as pupil and then as constructor, with the locomotive works of A. Borsig, in Berlin, and during that time attended the lecture courses on political economy and natural science, at the Berlin University. He then entered into practical service as a Civil and Mechanical Engineer upon the German railroads, serving in successively important capacities from that of a Locomotive Engineer up to that of General Manager. Subsequently he traveled professionally over the greater part of Europe, spending some time in England with Mr. Brunel and Mr. Stephenson. He also visited Northern Africa, at the request of the French Government, and wrote two books giving his observations upon that country. Returning to Germany, he was put in charge of the Erz Mountain Railroad. In 1850, he became Manager of State Telegraphs of the Saxon Government, and in 1852 became a member of the Royal Directory of Saxon Railroads with the title of Financial Councillor. In 1868, with a change of Administration, he left the Saxon service and accepted the appointment, at

NOTE.—The larger portion of the facts for the preparation of this memoir come from an article in the *German Railroad Union*. J. B., *Editor*.

Vienna, of Chief Consulting Engineer to the Austrian Ministry of Public Works, with the high rank of Imperial Councillor. He was entrusted with the preparation of a plan for the entire reorganization of the railways of Austria, and entered upon this work with zeal as peculiarly consonant with his desires. The retirement of the ministry and the occurrence of a financial crisis prevented the realization of these plans. He was not in entire accord with the subsequent ministry and in 1875 resigned his position. While in active supervision of the Austrian railways he studied technical questions arising in other countries, traveled over the railways of Northern Europe and reported on the question of the proper gauge to be adopted in Norway and Sweden. He also, during this period, inspected the railways of European and Asiatic Turkey.

His residence at Vienna, during several years after his resignation, gave opportunity for the exercise of his literary ability and his writings, particularly upon continental railway subjects, were frequent and of great interest.

In 1877, the Minister of Trade of the German Empire, Dr. Achenbach, appointed Baron von Weber, to the position of Consulting Engineer, with the understanding that he was to take the direction of a ministerial railway journal. The latter part of this project was not carried out, owing to the retirement of Dr. Achenbach from the Ministry directly afterwards, but von Weber was continued in his position with the Ministry of Trade and afterwards with the Ministry of Public Works, and was particularly commissioned to make official visits to and thorough studies of the railways and canals in Sweden, England, France and the United States of America.

In 1880 Baron von Weber came to America and traveled over the United States, extending his visit as far as New Orleans, St. Louis, Denver and Chicago. He was cordially welcomed by the Members of this Society and by all who had the pleasure of meeting him. His remarkable store of information on technical subjects was at once apparent, and his strong and positive ideas, often at variance with those held by American Engineers, led to many interesting conferences. Socially, he was most agreeable, and during the few months spent in this country formed friendships which have been very sadly broken by his unexpected decease.

The literary activity of Baron von Weber was remarkable. He treated in books, pamphlets and in contributions to journals, all the questions

writings, he showed additional artistic and versatile ability. His place in Germany, particularly as an exponent and promoter of technical progress will not soon be filled. His death, at the early age of 59, while still in the vigor of apparent health, and with projects formed for the preparation of several great works, is a positive loss to engineering and to the civilized world.

Baron von Weber died at Berlin, April 18, 1881, very suddenly of heart disease. He had that morning finished his official report to the Ministry of Public Works upon the railways and canals of the United States. He was a member of many of the learned and scientific societies of the world, and a commander and knight of high orders. He was made an Honorary Member of the American Society of Civil Engineers, June 2, 1880.

FRANCIS LAURENS VINTON, Member A. S. C. E.,

DIED OCTOBER 6TH, 1879.

Francis L. Vinton was born in 1832, his father being a distinguished officer of the United States Army. He graduated from the United States Military Academy at West Point in 1856. Resigning his commission soon afterwards, he prosecuted his studies for a number of years at the *Ecole des Mines* in Paris. He returned to the United States in 1860, and after a short time spent in giving instruction in the schools of the Cooper Union he went to Central America as engineer in charge of an exploration of the mineral resources of Honduras. At the beginning of the war of the rebellion, he returned to the United States, and was, on August 5th, 1861, commissioned as Captain in the Sixteenth United States Infantry. Directly afterwards he became Colonel of the Forty-third New York Volunteers, a regiment which gained special distinction under his command. Colonel Vinton was made Brigadier-General in March, 1862, and was given command of a brigade. He was severely wounded at the battle of Fredericksburg, and being disabled for active duty soon after resigned from the army.

In 1864, General Vinton became a professor in the School of Mines of Columbia College, and continued in that position until 1877, when he established himself as a Mining and Consulting Engineer in Colorado, with office at the City of Denver. He died quite suddenly at Leadville, at the date mentioned above.

General Vinton was an engineer of large theoretical acquirements, and his long service as an instructor had

Vienna, of Chief Consulting Engineer to the Austrian Ministry of Public Works, with the high rank of Imperial Councillor. He was entrusted with the preparation of a plan for the entire reorganization of the railways of Austria, and entered upon this work with zeal as peculiarly consonant with his desires. The retirement of the ministry and the occurrence of a financial crisis prevented the realization of these plans. He was not in entire accord with the subsequent ministry and in 1875 resigned his position. While in active supervision of the Austrian railways he studied technical questions arising in other countries, traveled over the railways of Northern Europe and reported on the question of the proper gauge to be adopted in Norway and Sweden. He also, during this period, inspected the railways of European and Asiatic Turkey.

His residence at Vienna, during several years after his resignation, gave opportunity for the exercise of his literary ability and his writings, particularly upon continental railway subjects, were frequent and of great interest.

In 1877, the Minister of Trade of the German Empire, Dr. Achenbach, appointed Baron von Weber, to the position of Consulting Engineer, with the understanding that he was to take the direction of a ministerial railway journal. The latter part of this project was not carried out, owing to the retirement of Dr. Achenbach from the Ministry directly afterwards, but von Weber was continued in his position with the Ministry of Trade and afterwards with the Ministry of Public Works, and was particularly commissioned to make official visits to and thorough studies of the railways and canals in Sweden, England, France and the United States of America.

In 1880 Baron von Weber came to America and traveled over the United States, extending his visit as far as New Orleans, St. Louis, Denver and Chicago. He was cordially welcomed by the Members of this Society and by all who had the pleasure of meeting him. His remarkable store of information on technical subjects was at once apparent, and his strong and positive ideas, often at variance with those held by American Engineers, led to many interesting conferences. Socially, he was most agreeable, and during the few months spent in this country formed friendships which have been very sadly broken by his unexpected decease.

The literary activity of Baron von Weber was remarkable. He treated in books, pamphlets and in contributions to journals, all the questions arising from time to time in the construction and operation of railways. His sketches or railway novels were of the greatest interest and influence, and entirely different from any previous treatment of such subjects. His large works, and particularly the School of the Railroad, and his Experiments on the Stability of Construction of Track, have become standard authorities. In the biography of his father, and in other

writings, he showed additional artistic and versatile ability. His place in Germany, particularly as an exponent and promoter of technical progress will not soon be filled. His death, at the early age of 59, while still in the vigor of apparent health, and with projects formed for the preparation of several great works, is a positive loss to engineering and to the civilized world.

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General Vinton was an engineer of large theoretical acquirements, and his long service as an instructor had prepared him fully for the practical work upon which he had entered so shortly before his decease. Personally he was peculiarly attractive and genial, an excellent musician, an accomplished mathematician, and had fine artistic tastes and abilities.

He became a Member of the American Society of Civil Engineers August 5th, 1868.

NORMAN A. WILLIAMS, Member A. S. C. E.,

DIED OCTOBER 12TH, 1879.

Norman A. Williams was born at Oriskany, New York, August 21st, 1837. He entered the Rensselaer Polytechnic Institute in 1856, graduating in 1859. During his connection with the institute Mr. Williams obtained very high class standing, and was particularly proficient in topographical draughting. Some work of this nature done by him subsequently for the Croton Water Department of New York is remarkably fine.

After graduating, Mr. Williams was engaged for four years as an assistant engineer upon the Brooklyn Water Works. He then entered the engineering service of the Croton Aqueduct Department of New York City. His work in these positions was accurate and conscientious, and he deeply regretted that his health prevented him from continuing the exercise of his chosen profession. This, however, was the fact, and therefore in 1864 he returned to Oneida County, becoming associated in business with his brother in the firm of J. H. & N. A. Williams, where he remained until his death. Mr. Williams was a man of modest and quiet demeanor, of marked ability and of admirable character both in principle and conduct, and was particularly known and appreciated as such in the city of his residence. He became a Member of the American Society of Civil Engineers, February 17th, 1869.

IRA EDGAR CLARK, Junior Member A. S. C. E.,

DIED MAY 23D, 1882.

Ira E. Clark* was born at Weston, Mass., October 18th, 1852. Educated at the district and high schools of his native town, he entered Cornell University in 1868, and graduated with the degree of Bachelor of Civil Engineering in 1872, at the age of twenty.

He was, directly after his graduation, appointed to a position in the office of the City Engineer of Cambridge, Mass., in which he continued for seven years, acquiring a valuable experience in the progress of the water works, the sewerage, and the miscellaneous engineering work of that city. In 1878 he was in Europe, visiting the principal cities, and attending the great exhibition in Paris, where he gave particular study to questions of water supply and sewerage.

In 1879, his health failing, he went to California and became interested in the construction of sub-irrigation works in the vicinity of San José. Here he remained until May, 1882, when he started for the State of Oregon, purposing to engage in railroad engineering. Arriving at

* Memoir prepared by Wm. S. Barbour, Member A. S. C. E., and the Secretary.

San Francisco he was prostrated by a hemorrhage of the lungs, which terminated his life on the 23d of May.

Mr. Clark was a man of quick perception, grasping and overcoming difficulties with great readiness. He was much devoted to his profession of civil engineering, in which there was every promise of eminence for him. He was of aimable character and greatly loved by many friends. He became a Junior Member of the American Society of Civil Engineers February 6th, 1878.

ADDITIONS TO

LIBRARY AND MUSEUM.

From Charles A. Allen, Worcester, Mass.:

Hearings before the Joint Standing Committee on Public Health, on the matter of restraining the City of Worcester from polluting Blackstone River. February and March, 1882.

Address of the Mayor, with the Annual Reports of the several Departments of the City of Worcester, year ending November 30, 1881.

From James P. Allen, Charleston, S. C.:

Municipal Report on Artesian Wells. Charleston, S. C.

From American Institute of Mining Engineers, T. M. Drown, Secretary, Easton, Pa.:

Transactions. Vol. IX.

From American Society of Mechanical Engineers, Thomas Whiteside Rae, Secretary, New York:

Transactions. Vol. I.

From Thomas S. Anderson, San Antonio, Texas.:

Financial Statement and Transactions and Exhibit of Levee Work of the Board of Mississippi Levee Commission.

From George D. Ansley, Montreal:

Annual Report of the City Surveyor of Montreal for 1881.

Report on Permanent Roadway Pavements for the City of Montreal. March 21, 1882.

From William S. Barbour, Cambridge, Mass.:

Cambridge City Documents. 1882.

Annual Report, City Engineer of Cambridge, for 1881.

Annual Report of Cambridge Water Board, for 1881.

From Jacob Blickensderfer, Omaha, Neb.:

Report of the Chief Engineer, Atlantic and Pacific Railroad.

From William H. Bradley, Boston.:

Annual Report on Sewerage of Boston, for 1881.

From H. Wadsworth Clarke, Syracuse, N. Y.:

Journal of the Board of Supervisors, of the County of Onondaga, N. Y., for 1881.

From Martin Coryell, Lambertville, N. J.:

Fifth Annual Meeting and Report of the Lambertville Water Co.

From Joseph P. Davis, New York:

Fourth and Fifth Annual Reports of the Boston Water Board. (3 copies.)

The Worcester Sewerage and the Blackstone River. (3 copies.)

From George W. Dresser, New York:

Improved Disirict Railway Map of London. 1880.

From A. J. Du Bois, New Haven:

A new Theory of the Suspension System with Stiffening Truss. A. J. Du Bois.

From James B. Eads, St. Louis:

Minority Report of Mississippi River Commission. (*Copies for distribution.*)

From Henry Faija, London, England:

Portland Cement for Users. Henry Faija, C. E. London. 1881.

From F. U. Farquhar, Detroit, Mich.:

Report upon the Construction of the Tillamook Rock Light House. Maj. G. L. Gillespie. Washington. 1881. (5 copies.)

From Albert Fink, New York:

Report on the Adjustment of Railroad Transportation rates to the Seaboard. Albert Fink. New York. 1882.

Argument before the Committee on Commerce, U. S. House of Representatives. Albert Fink. March 17th and 18th, 1882.

From Charles E. Fowler, New Haven:

Contract between the City of New Haven and New Haven Water Company.

Annual Reports of the Street Department of New Haven, for 1881. (2 copies.)

City Year Book of New Haven. 1881.

From James B. Francis, Lowell, Mass.:

Ninth Annual Report of the Lowell Water Board.

From James T. Gardiner, Albany, N. Y.:

Report on Methods of Sewerage for Cities and large Villages in the State of New York. (6 copies.)

From Wm. Paul Gerhard, Newport, R. I.:

House Drainage and Sanitary Plumbing. Wm. Paul Gerhard, C. E.

From Charles O. Gleim, Cologne, Germany:

Denkschrift uber die Kosten Binnenshiffahrt.

From Robert Gordon, Henzada, British Burmah:

Report on the Administration of British Burmah. 1880-'81.

From Lt. Com. H H. Gorringe, New York:

Egyptian Obelisks. H. H. Gorringe. New York. 1882.

From B. M. Harrod, New Orleans:

Note sur les divers moyens employes pour améliorer les conditions de navigabilité des rivieres. M. S. Janicki. Paris. 1880.

Seconde note sur les moyens employés pour améliorer les couditions de navigabilité des rivieres. M S. Janicki. Paris. 1880.

From James H. Harlow, Pittsburgh:

Forty-second Annual Report of the Monongahela Navigation Co.

From Clemens Herschel, Holyoke, Mass.:

Report of Committee appointed in relation to the Commonwealth Flats near South Boston. Boston. 1868.

From John Houston, La Guira, Venezuela:

Plano del Ferro carril del ajo de Agua à Caracas.

From Institution of Civil Engineers, James Forrest, Secretary, London:

Minutes of Proceedings. Vols. I to XX, inclusive.

Index to Vols. I to XX.

Transactions. Vol. III. 4to.

From Institution Engineers and Shipbuilders, Glasgow, Scotland:

Transactions. Vol. XXIV. 24th Session. 1880-81.

From Hon. David H. Jerome, Governor of Michigan. Lansing:

Annual Report of the Commissioner of Mineral Statistics for 1880.

From John B. Jervis, Rome, N. Y.:

Report on New York City Water Supply. John B. Jervis, C. E.

From H. Kato, University of Tokio, Japan:

Calendar of the Department of Law, Science, and Literature.

Geology of the Environs of Tokio.

Measurements of the Force of Gravity at Tokio and on the summit of Fujinoyama.

From John Kennedy, Montreal:

Annual Report of the Harbor Commissioners of Montreal, for 1881. (2 copies.)

From William Kingsford, New York:

The Canadian Canals. History, Cost, &c. Wm. Kingsford, C. E.

From John H. B. Latrobe, Baltimore, Md.:

The Capitol and Washington at the beginning of the present Century.

From Louis Lesage, Montreal:

Annual Reports of the City of Montreal, from 1872 to 1881, inclusive.

From Albert Levy, New York:

Photograph of the East River Bridge.

Lithograph of Isthmus Canal at Panama.

From Charles L. McAlpine, New York:

Annual Report of the Secretary of Internal Affairs of the State of Pennsylvania. Harrisburg. 1880.

Annual Report of the State Engineer and Surveyor on the Railroads of the State of New York. Albany. 1881.

Reports on the Grand Water Ways of Pennsylvania, for 1878, 1879 and 1880.

Report of the Pennsylvania Board, on the Northern and Western Boundary. Harrisburg. 1881.

From Colonel Wm. E. Merrill, U. S. A. Cincinnati:

Seven Photographs of Davis Island Dam.

From Gilbert Murdoch, St. John, N. B.:

Report on the Meteorological Service of the Dominion of Canada.

Special Report on Water Supply of St. John and Portland. (2 Copies.)

From Prof. Wm. Ripley Nichols, Boston:

Natural Filtration at Berlin. Wm. Ripley Nichols.

Remarks on Tastes and Odors of Surface Water. Wm. Ripley Nichols.

Sand Filtration. Wm. Ripley Nichols.

On the Temperature of Fresh Water Lakes and Ponds. Wm. Ripley Nichols.

From George B. Nicholson, New Orleans, La.:

Mineral and Agricultural Resources of the Portion of Tennessee along the C., S. and K. and O. R. R.

From Joseph Nimmo, Jr., Chief of Bureau of Statistics, Washington:

Annual Report on the Commerce and Navigation of the United States for the year ending June 30, 1881.

From North of England Institute Mining and Mechanical Engineers. Theo. Wood Bunning, Secretary. Newcastle-on-Tyne.

Transactions. Vol. XXX.

From F. L. Olmstead, New York:

The Spoils of the Central Park, New York City.

From Richard Potts, Chicago:

Annual Report on the General System of Sewerage of Chicago for 1882. G. Howard Ellers.

From D. C. Robinson, Elmira, N. Y.:

The Chemung Crossing Case. New York, Lackawanna and Western R. R. vs. New York, Lake Erie and Western R. R.

From Collingwood Schreiber, Ottawa, Canada:

Annual Report of the Minister of Railways and Canals of Canada for 1881.

Reports of Railway Statistics of Canada.

From W. W. C. Sites, Jersey City, N. J.:

The Proposed Dam Across the Passaic River.

Pollution of the Passaic River.

From State Board of Health, Albany, N. Y.:

Report on the Methods of Sewerage for Cities and large Villages. James T. Gardiner.

From McRee Swift, New Brunswick, N. J.:

Hutton's Mathematical Dictionary. Vols. I and II.

From U. S. Coast Survey, Washington.

Annual Report of U. S. Coast and Geodetic Survey. 1878.

From Hon. Jacob Vanderpool, Commissioner Dept. Docks, New York:

Report of Commission of Engineers upon

Construction of River Wall, Department of Docks. (*Copies for distribution.*)

From L. F. Harcourt, London:

A Treatise on Rivers and Canals. Vol. I. Text. Vol. II. Plates.

From Joseph E. Waltz, Dayton, Ohio:

Twelfth Annual Report of the Dayton Water Works. 1881.

From Welton & Bonnett, Waterbury, Conn.:

Fifteenth Annual Report of Waterbury Water Commissioners. 1881.

From H. M. Wightman, Boston:

Annual Report of City Engineer of Boston for 1881.

From Gen. H. G. Wright, Chief of Engineers, U. S. A., Washington:

Index to Annual Reports of Chief of Engineers, U. S. A. 1866-1879.

Annual Report of Chief of Engineers, U. S. A., for 1881. Parts I, II and III.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
ASSERSON, PETER C.	Civil Engineer, U. S. N., Norfolk, Va.	July 5, 1882.
LOCKE, AUGUSTUS W.	Manager Troy and Greenfield R. R. and Hoosac Tunnel, North Adams, Mass.	June 7, 1882.
LUDLOW, WILLIAM	Capt. Corps of Engineers, Bvt. Lieut. Col. U. S. A., Light House Board, Washington, D. C.	July 5, 1882.
PRATT, WILLIAM A.	Engineer Ohio and Baltimore Short Line R. R., Connellsville, Pa.	July 5, 1882.
RAY, NATHANIEL C.	Ass't. Engineer Union Pacific R. R., Boulder, Col.	July 5, 1882.
ROSECRANS, WILLIAM S.	San Francisco, Cal.	July 5, 1882.
SMITH, WILLIAM H.	Res. Engineer, New York, West Shore and Buffalo R. R., Oneida, N. Y.	July 5, 1882.

ASSOCIATE.

NICOL, THOMAS W.	Forlorn Hope, P. O., La.	June 7, 1882.

JUNIORS.

BLANC, FREDERIC N.	Care W. H. Gebhard, 21 Nassau Street, New York City, N. Y.	July 5, 1882.
MACKENZIE, WILLIAM B.	Ass't Engineer Intercolonial Railway, Moncton, N. B.	June 7, 1882.
PARSONS, WM. BARCLAY.	New York, Lake Erie and Western R. R., Port Jervis, N. Y.	June 7, 1882.

CHANGES AND CORRECTIONS.

MEMBERS.

ANDREWS, JOHN W.....Chief Engineer and Gen'l. Supt. Midland North Carolina R. R., New Berne, N. C.
BARNARD, A. P.....(Care of George H. Parsons) Colorado Springs, Col.
BATES, ONWARD.....Pres. Pittsburgh Bridge Co., Pittsburgh, Pa.
BENYAURD, WILLIAM H. H.Maj. Corps of Engineers, U. S. A., Chicago, Ill.
BIXBY, WILLIAM H.....Lieut. of Engineers, U. S. A., Willets Point, New York Harbor, N. Y.
DARRACH, CHARLES G...Ridley Park, Delaware Co., Pa.
DAVIS, CHARLES E. L. B.Capt. Corps of Engineers, U. S. A., Detroit, Mich.
DURHAM, C. WHEELER..Room 19, Tribune Building, New York City, N. Y.
FARQUHAR, FRANCIS U..Maj. Corps of Engineers, Bvt. Lieut. Col., U. S. A., Detroit, Mich.
GLASKIN, EDWIN E.....39 Broadway, New York City, N. Y.
HOUSTON, JOHN.....P. O. Box 145, Hackensack, N. J.
JAMES, JOHN C.....Ch. Eng. Canadian Pacific R. R., Winnipeg, Manitoba.
JOHN, IRVIN.....Phœnixville, Pa.
LINVILLE, JACOB H.....Morton, Pa.
LONG, THOMAS J.....Ass't. Engineer Dep't Docks, 119 Duane Street, New York City, N. Y.
TRUESDELL, CHARLES....Res. Engineer New York, Susquehanna and Western R. R., Delaware Water Gap. Pa.
WADDELL, JOHN A. L...Prof. of Civil Engineering, University of Tokio, Japan.
WAITE, C. C.....Vice-Pres. Cincinnati, Hamilton and Dayton R. R., Cincinnati, Ohio.
WEEKS, HARVEY R.....Chief Engineer E. K. R. R., Willard, Ky.
WEIR, CHARLES G.....24 East Tenth Street, New York City, N. Y.

ASSOCIATE.

HENDRIE, JOHN S.....Ontario and Quebec R. R., Peterborough, Canada.

JUNIORS.

BROOKS, FREDERICK....Mexican Central Railroad. San Luis Potosi, Mexico.
BURDETT, CHARLES L...Room 21, Trust Co. Block, Hartford, Conn.
CURTIS, WENDELL R....Rockland, Plymouth Co., Mass.

DEATHS.

BRIGGS, ROBERT.....Elected Member October 19, 1870. Died July 24, 1882.
HYDE, WILLIAM B.....Elected Member July 12, 1877. Died June 18, 1882.
CLARK, IRA E.....Elected Junior February 6, 1878. Died May 23, 1882.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—August, 1882.

NOTE.—No meetings of the Society are held in August.

ADDITIONS TO
LIBRARY AND MUSEUM.

From American Academy of Arts and Sciences Cambridge, Mass.:

Memoirs. Centennial Volume. Vol. XI. Part I.

From American Chemical Society. P. Cassamajor, Secretary, New York:

Journal of the Society. Vol. III. 1881.

From American Society of Mechanical Engineers. Thomas Whiteside Rae, Secretary, New York:

Proceedings of the Society. Second Regular Meeting, 1881. Altoona, Pa.

Counter-Balancing of Engines and other Machinery having Reciprocating parts. Prof. S. W. Robinson.

Comparison between different types of Engines. Charles A. Hague.

Fire Protection of Mills. C. J. H. Woodbury.

The Lifetime or Age of Steam Boilers. William Barnet Le Van.

Mill Floors. C. J. H. Woodbury.

Railroad Economics, or Notes and Observations from the Ohio State Railway Inspection Service. Prof. S. W. Robinson.

Method of Arranging and Indexing Drawings and Patterns. Albert F. Hall.

Rolled Cast-Steel Car Wheels. Jacob Reese.

Nomenclature of Machine Details. Oberlin Smith.

The Latest Methods of Submarine Telegraph Work. Thomas Whiteside Rae.

Note Relating to the Proper Method of Expansion of Steam and Regulation of the Engine. Prof. R. H Thurston.

Coffin's Averaging Instrument. John E. Sweet.

Use of the Calorimeter as a Pyrometer for High Temperatures. J. C. Hoadley, C. E.

A Rational System of Piston Packing. Prof. S. W. Robinson.

The Binary Absorption System of Ice Machinery. H. F. J. Porter, M. E.

Experimental Mechanics. Oberlin Smith.

The Continuous Rod Mill of the Trenton Iron Co. William Hewitt.

A Brief Treatise on the Steamboat Cam. Lewis Johnson.

Most Economical Point of Cut-Off in Steam Engines. No. I. Alfred R. Wolff, M. E., and James E. Denton, M. E.

Most Economical Point of Cut-Off in Steam Engines. No. II. Alfred R. Wolff, M. E., and James E. Denton, M. E.

From Association of Engineering Societies. H. G. Prout, Secretary of Board, New York:

Journal of the Association. Vol. I. No. 7. May, 1882.

From Eustaquio Buelna, Durango, Mexico:

Compendio, Historico, Geografico y Estadistico del Sinaloa. Eustaquio Buelna, Mexico, 1881.

From Mendes Cohen, Baltimore:

A Complete Set of Reports of the Baltimore and Ohio Railroad from 1827 to 1879, inclusive. Bound in 7 Volumes.

Fifty-fourth and Fifty-fifth Annual Reports of the Baltimore and Ohio Railroad for the years ending Sept. 30th, 1880 and 1881.

From Denver Society of Civil Engineers. Arthur I. Fonda, Cor. Secretary, Denver, Col.:

Constitution and By-Laws, Blank Application and List of Officers of the Society.

From James B. Eads, St. Louis:

Answer of James B. Eads, Correcting the Erroneous Statements of the Promoters of the Nicaragua Canal Scheme. Washington, 1882. (*Copies for distribution.*)

From Engineers' Club of Philadelphia. Howard Murphy, Cor. Secretary:

Proceedings. Vol. III. Nos. 1 and 2.

From Franklin Institute. Wm. H. Wahl, Secretary, Philadelphia:

Journal of the Institute. July and August, 1882.

From William Frazier, Boston:

Prospectus of the Paris, Georgetown and Frankfort Railroad. Cambridge, 1881.

From Institution of Civil Engineers. James Forrest, Secretary, London:

Publications edited by the Secretary, as follows:

The Rokugo River Bridge and Foundations on the Tokio-Yokohama Railway, Japan. Richard V. Boyce.

Light Scaffolding. John Cundy.

New York Elevated Railroads. Robert E. Johnston.

Canal Navigation in Belgium. A. Gobert. Translated by Alfred Bache.

The Burning of Town Refuse at Leeds. Charles Slagg.

Lancaster Water Works Extension. James Mansergh.

From Metropolitan Museum of Art. L. P. Di Cesnola, Secretary, Central Park, New York:

Twelfth Annual Report of the Trustees of the Association. New York, 1881.

From Mining Institute of Scotland. James Gilchrist, Secretary, Hamilton:

Transactions. Vol. IV, No. 3. General Meeting. June, 1882.

From Joseph Nimmo, Jr., Chief of Bureau of Statistics, Washington, D. C.:

Imported Merchandise entered for Consumption in the United States, with rates of Duty and amount of Duties Collected.

Comparative Rates of Wages in the United States and in Foreign Countries. Joseph Nimmo, Jr. May 1, 1882.

From North of England Institute of Mining and Mechanical Engineers. Theo. Wood Bunning, Secretary, Newcastle-on-Tyne:

Transactions. Vol. XXXI. Part 4. June, 1882.

From Charles Paine, New York:

The Culture and Management of our Native Forests for Development as Timber or Ornamental Wood. H. W. S. Cleveland. Springfield, 1882. (Several copies.)

From Gen. O. M. Poe, U. S. A., Washington, D. C.:

Reports of Inspection made in summer of 1877, by Generals P. H. Sheridan and W. T. Sherman of Country North of the Union Pacific Railroad. Washington. 1878.

From M. E. Pontzen, Paris:

Notice sur les Appareils Électrique exposes par La Société Antrichienne.

Notice descriptive, des Appareils Électriques exposes par la Compagnie du Chemin de fer du Nord. Lille. 1881.

Résume d'une étude sur la Creation d'un Port du Mer à Paris. M. Bouquet de la Grye. Paris. 1882.

Ueber das Technische Schul-und Vereinswesen Franksreich. Wilhelm von Nördling. 1881.

From H. V. Poor, New York:

Sketch of the Rise and Progress of the Internal Improvements, and of the Internal Commerce of the United States, with a review of the charges of monopoly and oppression made against Railroad Corporations. Henry V. Poor. New York. 1881.

From Royal United Service Institution: Capt. B. Burgess, Secretary, London.

Journal of the Institution. Vol. XXV. No. 113.

From John C. Trautwine, Philadelphia:

The Field Practice of Laying out Circular Curves for Railroads. John C. Trautwine, C. E. Philadelphia. 1882.

From U. S. Signal Service, Gen. W. B. Hazen, Chief Officer, Washington:

Professional Papers of the Signal Service as follows:

Isothermal Lines of the United States 1871-1880. Lieut. A. W. Greely.

Chronological List of Auroras observed from 1870 to 1879. Lieut. A. W. Greely.

Information relative to the Construction and Maintenance of Time Balls. Winslow Upton.

The Reduction of Air Pressure to Sea Level at Elevated Stations West of the Mississippi River. Henry A. Hazen, A. M.

From William Watson, Boston:

A Report to the American Social Science Association on the Protection of Life from Casualties in the use of Machinery. William Watson, Ph. D.

From Gen. Francis A. Walker, Supt. Tenth Census of the United States, Washington, D. C.:

Statistics of the Production of the Precious Metals in the United States. Clarence King. (2 copies.)

Statistics of the Iron and Steel Production of the United States. James M. Swank.

From other sources:

Introductory Report. Massachusetts Laws.

Mexican Concessions. By-Laws of the Mexican Central Railway Co., Limited.

Second Annual Report of the Board of Directors of the Sonora Railway Company, Limited, year ending December 31, 1881. Boston. 1882.

Massachusetts Laws. Mexican Concessions, First Mortgage Deed. By-laws of the Sonora Railway Company, Limited.

Annual Report of the Chief Engineer of the Water Department of Philadelphia for the year 1880.

History of the Boston and Bangor Steamship Company, formerly known as Sanford's Independent Line. (1823-1882.) Boston.

THE NORMAN MEDAL.

CODE OF RULES FOR ITS AWARD.

I.—Competition for the Norman Medal of the American Society of Civil Engineers shall be restricted to Members of the Society.

II.—There shall be one gold medal, and only one, struck for each and every fiscal year of the Society, and awarded as hereinafter provided. The dies therefor shall be with the Superintendent of the United States Mint at Philadelphia, in trust exclusively for the above purpose. Such Medal shall be of a cost equal to the annual interest received upon $1 000 of the Consolidated Stock of the City of New York, Certificate No. 179, of the additional new Croton Aqueduct Stock of the City of New York, authorized by an Act of the Legislature of the State of New York, Chap. 230, passed April 15th, 1870, dated November 17th, 1873, now held in trust by the Treasurer of this Society, and so held solely for this purpose, and shall be executed upon his order.

III.—All original papers presented to the Society by members of any class, during the year for which the medal is awarded, shall be open to the awards, provided that such papers shall not have been previously contributed in whole or in part to any other association, nor have appeared in print prior to their publication by the Society, nor have been presented to the Society in any previous year.

IV.—The Board of Censors to award the Medal shall consist of three members of the Society, to be designated by the Board of Direction. The Secretary of the Society shall act as Secretary to the Board of Censors.

V.—The medal shall be awarded to such paper as the said Board shall judge to be worthy of special commendation for its merits as a contribution to Engineering Science, not merely relatively as compared with others presented during the same year, but as exhibiting the science, talent or industry displayed in the consideration of the subject treated of, and for the good which may be expected to result from the discussion and the inquiry.

VI.—In case no paper presented during the year shall be deemed of sufficient value to receive an award, the amount of the interest of the fund for that year shall be expended by the Board of Direction in the purchase of books, to be offered as a premium for the second best paper in the next year in which more than one paper of sufficient value may be presented.

VII.—The medal year shall terminate on the first day of August, and the award shall be announced at the Annual Meeting.

VIII.—The Treasurer of this Society shall cause the medal to be prepared and delivered to, or deposited to the order of, the successful competitor, within two months after the Annual Meeting at which the same shall have been awarded.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
BURNS, EDWARD COOK	U. S. Ass. Engineer, Sault Ste. Marie, Mich.	July 5, 1882.
CLARK, DAVID DEXTER	Northern Pacific R. R., New Tacoma, Washington Ter.	July 5, 1882.
SCHUYLER, HOWARD	Apartado 212, Mexico, Mexico	June 7, 1882.

CHANGES AND CORRECTIONS.

MEMBERS.

ANDERSON, T. S.	San Antonio, Texas.
COMSTOCK, C. B.	Major Corps Engineers, Bvt. Brig. Gen. U. S. A., 33 West Houston Street, New York.
DOANE, W. A.	Ass. Engineer, Ontario and Quebec Railway, Lock Box 120, Peterborough, Ont. Canada.
KIMBERLY, M. C.	Gen. Ass. Eng., N. P. R. R., Brainerd, Minn.
NICHOLSON, GEO. B.	190 Common Street, New Orleans, La.
POST, L. W.	315 Collins Street, Atlanta, Georgia.
WIMMER, S.	St. Marys, Elk County, Pennsylvania.

ASSOCIATES.

HAMMOND, H. B.	67 Wall Street, New York.
LOCKWOOD, JOHN	52 Broadway, New York.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—September, 1882.

MINUTES OF MEETINGS

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

SEPTEMBER 6, 1882.—The Society met at 8 P.M., Mr. Theodore Cooper in the chair. Ballots for membership were canvassed and the following candidates were declared elected: as Members—William Herbert Baker, Las Vegas, N. M.; Richard Somers Hayes, St. Louis, Mo.; Horace E. Horton, Rochester, Minn.; Marsden Manson, San Francisco, Cal.; Samuel H. Miller, Danville, Ill.; William Raymond Morley, Hermosillo, Sonora, Mexico; Arthur Bickley Paine, New York City, N. Y.; John Addison Partridge, Syracuse, N. Y.; James Ross, Toronto, Canada; Thomas William Symons, Washington, D. C.; as Associate—Paul S. Reeves, Phœnixville, Pa.; as Juniors—George Edward Thackray, St. Joseph, Mo.; Albert Lowry Webster, Washington, D. C.

The canvass of the vote on the following question was announced:

"Do you consider it expedient and advisable that the Board of Direction of the American Society of Civil Engineers should comply with requests to nominate Engineers from whom may be selected members of advisory professional Boards?"

In the affirmative there were	151 votes.
" " negative	85 "
Total	236 votes.

The following deaths were announced:

ROBERT BRIGGS, of Philadelphia, Pa.; elected Member October 19, 1870, died July 24, 1882.

WILLIAM B. HYDE, of Oakland, Cal.; elected Member July 12, 1877, died June 18, 1882.

The Norman Medal, the award of which was announced at the Washington Convention, was presented to the recipient, Mr. L. L. Buck, M. Am. Soc. C. E.

Mr. J. B. Browne, C. E., practically exhibited the working of the Fleuss Diving and Noxious Gas Apparatus and the Safety Lamp, and read a short paper on the subject which was discussed by the members present.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
Miller, Samuel H.	Chief Engineer Chicago and Eastern Illinois R. R., Danville, Ill.	Sept. 6, 1882.
Paine, Arthur B	Chief Engineer Pennsylvania and New England R. R., 97 Nassau St., New York City, N. Y.	" "
Partridge, John A.	Div. Engineer New York, West Shore and Buffalo R. R., Syracuse, N. Y.	" "

JUNIOR.

Rosenweig, Alfred.	Ass't. Engineer Mexican Central R. R. (care James Harrington), Tampico, Mexico.	June 7, 1882.

CHANGES AND CORRECTIONS.

MEMBERS.

Briggs, Roswell E. . . . Chief Engineer 2d. Div. Mex. Cent. R. R., Aguescalientes, Mexico.
Cunningham, James H. . Jos. Tillotson & Co., Black Bull St., Leeds, England.
Doane, Edwin A. . . . . Meadville, Pa.
Engle, Robert L. . . . . 143 Smith St., Cincinnati, Ohio.
McKee, Charles H. . . Ass't. Eng'r. Del. and H. C. Co. R. R., Albany, N. Y.
Pettit, Robert E. . . . . Supt. N. Y. Div. P. R. R., Jersey City, N. J.
Schmidt, Max E. . . . . Mexican Central R. R., San Luis Potosi, Mexico.
Smith, Wm. Sooy. . . . . Montauk Block, Room 52, Chicago, Ill.
Wellington, Arthur M Ass't Gen. Man. Mex. Cent. R. R., Guadalajara, Mex.
Yonge, Samuel H. . . . . Chief Eng'r. Leav. Div. U. S. Improvement Mo. River, Leavenworth, Kansas.

ASSOCIATE.

Harris, Charles M. . . . See'y. Parson Steam Co., 95 Liberty St., New York City.

JUNIORS.

Butts, Edward. . . . . P. O. Box L., Kansas City, Mo.
Haviland, Arthur. . . . . Res. Eng'r N. Y., W. S. & B. R.R., 8 Tweddle Hall, Albany, N. Y.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—October, 1882.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

SEPTEMBER 20TH, 1882.—The Society met at 8 P. M., Vice-President Wm. H. Paine in the chair.

A paper by William Bell Dawson, C. E., on "Rapid Methods of Topographical Surveying," was, in the absence of the author, read by the Secretary, and discussed by Messrs. Bogart, Paine and Stanton.

OCTOBER 4TH, 1882.—The Society met at 8 P. M., Vice-President Wm. H. Paine in the chair.

The Vice-President announced, with appropriate remarks, the death of the late President of the Society, Mr. Ashbel Welch, which occurred September 25th, 1882.

The following preamble and resolutions, presented from the Board of Direction, were adopted:

Resolved, That there be entered upon the official Minutes an expression of the great loss this Society has sustained in the death of its President, Ashbel Welch.

In the successful labors of a long life he has constantly added to the respect and dignity of our profession. Thoroughness and conscientiousness were characteristic of all his works, and these qualities, added to a special ability and clear judgment, secured for him in all his personal relations the peculiar confidence and friendship of those who have been associated with him.

His earnest devotion to the high trusts confided to him by this Society has greatly extended its usefulness and its permanent advantage.

Resolved, That the Vice-President presiding be authorized to appoint a Committee to prepare a memoir of the late President for publication in the Proceedings of the Society.

Señor Francisco de Garay, C. E., of Mexico, gave an account of the topography of the Valley of Mexico, of the measures taken in the past for its drainage, and of the methods now proposed to be adopted for that purpose. The subject was discussed by the members present.

October 18th, 1882.—The Society met at 8 P. M., Vice-President Wm. H. Paine in the chair.

The death of Henrique Harris, M. Am. Soc. C. E., elected member December 3d, 1879, died October 10th, 1882, was announced, and the Vice-President authorized to appoint a Committee to prepare a memoir for publication in the Proceedings.

A paper by Henry D. Blunden, M. Am. Soc. C. E., on the "Care and Maintenance of Iron Bridges," was read and discussed by Messrs. Macdonald, Cooper, Davis, Worthen, Paine, Sanderson, Emery, Campbell and Shreve.

OF THE BOARD OF DIRECTION.

August 8th, 1882.—Applications were considered.

The President and Secretary presented suggestions received by them in correspondence from a number of members on the subject of the method for preparing a programme of tests to be submitted to the Chief of Ordnance. The President, Vice-President Wm. H. Paine and the Secretary were appointed a Committee on the subject of the preparation of a programme of tests to be submitted to the Chief of Ordnance. The Secretary was instructed, that if the canvass of votes on August 12th, on the subject of nominations of engineers from whom may be selected members of Advisory Boards, shows a majority in favor of such action by the Board of Direction, he should ascertain from the Franklin Institute what mode of procedure will be agreeable to that Institute to comply with the ordinance of the Councils of the City of Philadelphia.

SEPTEMBER 22D, 1882.—A letter was received from the Mayor of Philadelphia, enclosing copy of certain Proceedings of the Franklin Institute in reference to the appointment of experts upon the subject of the water supply of that city. The Secretary reported to the Board that he had requested the Franklin Institute to state what mode of procedure would be agreeable to that Institute to comply with the ordinance of the Councils of the City of Philadelphia. The Secretary was instructed to reply to the Mayor, enclosing a statement of the facts, as far as this Society is concerned, connected with the ordinance referred to, and state that it is the desire of this Board, in accordance with the vote of the Society, to act in compliance with that ordinance.

The vote of the Society on this subject is given in Proceedings for September, Vol. VIII., page 101, *ante.*

The Secretary presented an announcement from the American Society of Mechanical Engineers, stating that arrangements had been made to hold a joint meeting of that Society, together with the American Institute of Mining Engineers and the American Society of Civil Engineers, in memory of the late Alexander L. Holley, on or about November 1st, in the City of New York. The Secretary was instructed to take such measures on the subject as should be proper.

OCTOBER 3D, 1882.—Applications were considered. Upon the recommendation of the Committee on Library, the following resolution was adopted:

That it be recommended to members of the Society having occasion to designate themselves as such, to use the following abbreviations only:

For Honorary Members	Hon. M. Am. Soc. C. E.
For Members	M. Am. Soc. C. E.
For Associates	Assoc. Am. Soc. C. E.
For Juniors	Jun. Am. Soc. C. E.
For Fellows	F. Am. Soc. C. E.

Under the code of rules for award of the Norman Medal, the Board designated the following named members of the Society as a Board of Censors: George S. Greene, William E. Merrill, John Kennedy.

Quarterly appropriations were made.

A letter from the President of the Franklin Institute of Philadelphia was presented, and in accordance with the suggestions of that letter, the names of fourteen engineers were transmitted for the consideration of that Institute, from which fourteen names might be selected, the nine to be nominated, conjointly with the Franklin Institute, to the Mayor of Philadelphia, in compliance with the ordinance of the Councils of that City.

The death on September 25th, 1882, of Mr. Ashbel Welch, President of the Society, was announced, and the following resolutions were adopted:

For the first time in its history this Society has sustained the loss by death of its President.

The Board of Direction desire to express their deep sense of this loss, and their high appreciation of the purity of character, the professional eminence, and the administrative ability of the late President of the American Society of Civil Engineers, Ashbel Welch.

The Board further desires to place on record an expression of the high regard which their intercourse with Mr. Welch has inspired in his relations as an officer of the Society, as an eminent leader in the profession of Civil Engineering, and as a man.

OCTOBER 18TH, 1882.—A communication from the President of the Franklin Institute, enclosing extracts from the minutes of a meeting of the Board of Managers of that Institute, was presented. The following preamble and resolutions were adopted:

Whereas, in a communication from the President of the Franklin Institute, dated October 12th, 1882, and in accompanying extract from the minutes of the Board of Managers of the Franklin Institute, there are presented nine names of engineers as nominated by the Board of Managers of the Franklin Institute for presentation to the Mayor of the City of Philadelphia under the provisions of an ordinance of the Councils of that City, approved June 7th, 1882, and the concurrence of the American Society of Civil Engineers is requested to those nominations. And

Whereas, eight of the names of such nominated engineers are selected from the nominations of fourteen engineers heretofore made by this Board, in accordance with the suggestion of the President of the Franklin Institute, and transmitted to him in the letter from the Secretary of this Society, dated October 4th, 1882. And

Whereas, one of the names of the engineers nominated by the Board of Managers of the Franklin Institute is not contained in the list of fourteen engineers heretofore nominated by this Board. And

Whereas, in the letter of the President of the Franklin Institute, dated October 12th, 1882, it is stated that Mr. J. Vaughan Merrick (the engineer whose name was not contained in the list nominated by this Board) "is a son of the founder of the Franklin Institute, and who "served us acceptably as President. He is an eminent mechanical en- "gineer, for many years at the head of Southwark Foundry, and he is "identified with the best interests of the City of Philadelphia." Therefore,

Resolved, That the Board of Direction of the American Society of Civil Engineers accepts the addition of the name of J. Vaughan Merrick, and concurs in the nomination of the nine engineers named in the above-mentioned communication from the President of, and extract from

the minutes of, the Franklin Institute, namely: Frederick Graff, James B. Francis, E. D. Leavitt, Jr., E. S. Chesbrough, William E. Worthen, George S. Greene, William P. Trowbridge, John C. Hoadley and J. Vaughan Merrick.

Resolved, That the Secretary communicate this action to the Franklin Institute, and to the Mayor of Philadelphia.

OCTOBER 31ST, 1882.—Applications were considered. Appropriations were made. The report of the Nominating Committee was received.

The subject of the commutation of annual dues by a single payment was discussed, and it was determined to recommend to the Society the adoption of a proposed amendment to the Constitution. This amendment will be printed with the Proceedings of the Society for November 1st.

ADDITIONS TO

LIBRARY AND MUSEUM.

From American Iron and Steel Association, James M. Swank, Secretary, Philadelphia:

Directory of the Iron and Steel Works of the United States, corrected to July 25, 1882.

From Association of Engineering Societies, H. G. Prout, Secretary of Board, New York:

Journal of the Association. Vol. I. Nos. 8 and 9. June and July, 1882.

From William H. Bixby, Willets' Point, N. Y. Harbor:

Notes on the Pointe de Grave, River Gironde, France. Lieut. Wm. H. Bixby, Corps of Engineers, U. S. A.

From Boston Public Library, Mellen Chamberlain, Librarian, Boston:

Thirtieth Annual Report. 1882.

From P. H. Dudley, New York:

A set of Condensed Diagrams of Track Inspection, New York Central and Hudson River Railroad. August, 1882. P. H. Dudley, C. E.

From Sandford Flemming, Ottawa, Canada:

Letter to the President of the American Association for the Advancement of Science, on the subject of Standard Time for the United States, Canada and Mexico. Sandford Flemming, Chairman Special Committee, Am. Soc. C. E. August, 1882.

From James T. Gardiner, Albany, N. Y.:

Report of the New York State Survey for the year 1880. James T. Gardiner, Director.

From John J. Gorman, President Fire Commissioners, New York:

Reports of the Fire Department of the City of New York for the three months ending December 31, 1879, 1880 and 1881.

From Institution of Civil Engineers, James Forrest, Secretary, London:

Publications edited by the Secretary, as follows:

The Design of Structures to resist Wind Pressure. Charles B. Bender.

The Resistance of Viaducts to Sudden Gusts of Wind. Jules Gaudard.

On the Theory of the Gas Engine. Dugald Clerk.

Steel for Structures. Ewing Matheson.

From McGill University, Montreal, Canada:

Annual Calendar. 1882-3.

From Mining Institute of Scotland, James Gilchrist, Secretary, Hamilton:

Transactions. General Meeting, July, 1882.

From John Nader, Madison, Wis.:

The Tides. A paper read before the Academy of Sciences, Arts and Letters, December, 1879. John Nader, C. E.

From H. V. and H. W. Poor, New York:
Manual of the Railroad of the United States. H. V. Poor. 15th Annual Number. New York, 1882.

From Société des Ingenieurs Civils, Paris;
Memoirés. August, 1882.

From U. S. Coast Survey, Washington.
Annual Report of U. S. Coast and Geodetic Survey. 1879.

From U. S. Ordnance Department. Gen. S. V. Benet, Chief, Washington, D. C.:
Ordnance Notes, as follows:
Report of Sea-Coast Artillery Practice at the Artillery School, Fort Monroe, Va., during the year 1881. Bvt.-Col. Richard Lodor.
The Leboulengé Chronograph Modified by M. Préger, Capt. of Marine Artillery.
The Progress in Naval Artillery from 1855 to 1880.
Cavelier de Cuverville. Translated by Lieut. C. W. Whipple.
Firing Investigations of the Steel Works of Frederick Krupp, made at the Meppen Firing Grounds. Translated by Lieut. E. L. Zalinski.
The Question of Heavy Guns. From the *Memorial de Artilleria*. Translated by Lieut. Rogers Birnie, Jr.
Range and Position Finding—Past and Present. Capt. H. Watkin, R. A.
On the Metallurgy and Manufacture of Modern British Ordnance. Col. Maitland, Supt., R. G. F., Woolwich.
Notes on the Manufacture of Small Arms, &c., at the Royal Small Arms Factory, Enfield Lock. Capt. McClintock.
On the Application of Solid Steel to the Manufacture of Small Arms, Projectiles and Ordnance. Ferdinand Gautier.
Metrical into U. S. Measures—Conversion of Metrical into United States Measures, and *vice versa*, with Tables adopted to a Comparison of our own with foreign Guns. Lieut. Rogers Birnie.
Mechanical Motion. Lieut.-Col. A. R. Buffington.
Report on Cranston's Safety Lighting Attachment for Lanterns for the Life Saving Service. Capt. D. A. Lyle.
The Folger Michelson Densimeter. Lieut.-Com. W. M. Folger, U. S. N., and A. A. Michelson, Master, U. S. N.

From Gen. H. G. Wright, Chief of Engineers, U. S. A., Washington, D. C.:
Report upon a Survey of Pass Manchac and Bayou Manchac, La., from its Mouth to the Mississippi River. Maj. Amos Stickney.
Report upon an Examination of Oregon Inlet, North Carolina. Capt. James Mercur.
Communication of the Chief of Engineers with report upon a survey made with the view of opening a steamboat communication from Saint John's River, Fla., by way of Topokalija Lake to Charlotte Harbor or Peace Creek. Gen. Q. A. Gilmore.
Communication from the Chief of Engineers and accompanying report upon a survey of the Columbia River at the Dalles, in Oregon. Capt. Charles F. Powell.
Communication from the Chief of Engineers and accompanying report upon a survey for a breakwater in Lake Pontchartrain in the vicinity of the New Canal outlet near New Orleans. Maj. Amos Stickney.
Testimony before the Select Committee of the Senate appointed to investigate and report as to the condition of the Potomac River Front of Washington. 1882. (2 copies.)

From other sources;
The Library Journal. Vol. VII. Nos. 7-8.
Report of the Committee on Foreign Affairs on the Nicaragua Canal. 1882.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
Baker, William H.	Atchison, Topeka and Santa Fé R.R., Las Vegas, N. M.	Sept. 6, 1882.
Calkins, Frank A	75 West 127th St., New York City, N. Y.	April 5, 1882.
Hayes, Richard S.	Sr. Vice-President Missouri Pacific Ry., St. Louis, Mo.	Sept. 6, 1882.
Horton, Horace E.	Civil Engineer, Rochester, Minn.	Sept. 6, 1882.
Le Baron, J. Francis.	U. S. Ass't Engineer, P. O. Box 738, Jacksonville, Fla.	June 7, 1882.
Manson, Marsden	U. S. Ass't Engineer, San Francisco, Cal.	Sept. 6, 1882.

MARTIN, WILLIAM H....39 Wall St., New York City, N. Y.....Mar. 1, 1882.
MORLEY, WILLIAM R....Chief Engineer, Mexican Central Ry., Paso del Norte, Mexico.....Sept. 6, 1882.
ROSS, JAMES.....Gen. Supt. and Chief Engineer, Credit Valley R.R., Toronto, Canada .....Sept. 6, 1882.
SURTEES, ROBERT.....Manager Water Works, Ottawa, Canada. April 5, 1882.
SYMONS, THOMAS W....1st Lieut. Corps of Engineers, U. S. A., Vancouver Barracks, Washington Territory.....Sept. 6, 1882.

ASSOCIATE.

REEVES, PAUL S..... 760 S. Broad St., Philadelphia, Pa.....Sept. 6, 1882.

JUNIORS.

THACKRAY, GEORGE E...Youngstown Steel Co., Youngstown, O..Sept. 6, 1882.
WEBSTER, ALBERT L....U. S. Geological Survey, Winnemucca, Nevada.....Sept. 6, 1882.

CHANGES AND CORRECTIONS.

MEMBERS.

ALDRICH, TRUMAN H...Southern Ave., Mt. Auburn, Cincinnati, Ohio.
BURNET, GEORGE, JR....Sewer Department, St. Louis, Mo.
DUN, JAMES.....Ch. Eng. St. L. and S. F. R.R., St. Louis, Mo.
GODWIN, BRYANT.....Templehofer, Ufer 24, Berlin, S. W. Germany.
HARRIS, ROBERT L.....Care J. S. Barnes, 18 Wall St., New York City, N. Y.
JOHN, IRVIN.....Phœnix Iron Works, Opelika, Ala.
LEHNARTZ, FRED'K W...P. O. Drawer 432, New Orleans, La.
NICOLLS, WILLIAM J....261 South Third St., Philadelphia, Pa.
ROCKWELL, SAMUEL.....1434 Broadway, Kansas City, Mo.
SEARLES, WILLIAM H....4 South Water St., Cleveland, Ohio.
SEARS, CLINTON B.....Capt. Corps of Engs. U. S. A., 2653 Olive St., St. Louis, Mo.
SEELY, THOMAS J.....Supt. Sonora Ry., Guaymas, Sonora, Mex.
SHAILER, ROBERT A....Eng. Bridges C. M. and St. P. R.R., Milwaukee, Wis.
SMITH, FREDERICK H...St. Denis, Md.
WIMMER, SEBASTIAN....50 Irving Place, New York City, N. Y.

ASSOCIATE.

ANDREWS, EDWARD R...24 Park Place, New York City, N. Y.

JUNIORS.

ALLEN, JAMES P.....50 St. Philip St., Charleston, S. C.
FERGUSON, JOHN W.....Ass't Eng., N. Y., L. E. and W. R.R., Rutherford, N. J.
HORTON, SANDFORD.....251 Michigan St., Buffalo, N. Y.
NOYES, ELLIS B.....146 Jefferson St., Brooklyn, N. Y.
STAATS, ROBERT P.....Ass't Eng. N. Y., L. E. and W. R.R., 187 West St., New York City, N. Y.

FELLOWS.

CLARK, EDWARD W.....35 South Third St., Philadelphia, Pa.
GILMAN, CHARLES C....71 Broadway, Room 68, New York City, N. Y.

DEATHS.

HARRIS, HENRIQUE.....Elected Member Dec. 3, 1879. Died Oct. 10, 1882.
WELCH, ASHBEL, President of the Society. Elected Member Aug. 7, 1872, Died Sept. 25, 1882.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—November, 1882.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

NOVEMBER 1ST, 1882.—The Society met at 8 P. M., Treasurer J. J. R. Croes in the chair.

The following proposed amendments to the Constitution were regularly submitted:

PROPOSED AMENDMENT TO ARTICLE XXII.

Add at end of Article as follows:

Any member of the Society, not in arrears for dues, may compound for future annual dues by the payment of Two Hundred and Fifty Dollars: Provided, however, that each person duly elected a member shall pay the entrance fee and also the annual dues for the current year of his election.

Provided, also, that any member desiring to compound for future annual dues shall have paid the annual dues for a current year before the compounding sum may be available.

Provided, also, that in addition to the sum provided for compounding dues, there shall be paid by each compounding member, resident within fifty miles of the Post Office in the City of New York, the sum of Ten Dollars per year for five years after compounding.

Should a resident member become non-resident at any time during the five years after compounding, he shall be relieved from the payment of such annual sum during the time of non-residence.

Should a non-resident member become resident at any time within five years after compounding, he shall be liable to the annual payment of Ten Dollars for each year of residence up to five years after compounding.

Members compounding shall sign an agreement that they will be governed by the Constitution and By-laws of the Society as they are now formed or as they may be hereafter altered, amended or enlarged; that in case of their desiring to withdraw their names from the roll of the Society, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society; that in case of expulsion, the amount paid for compounding shall be returned to the expelled member, but not the amount theretofore paid for entrance fees or for annual dues.

The above amendment is proposed by the following-named members of the Society: William H. Paine, J. J. R. Croes, Joseph P. Davis, George S. Greene, Jr., and John Bogart.

It is recommended by the Board of Direction for adoption, in accordance with a resolution of the Society passed April 5th, 1882, requesting

the Board to submit a plan for life membership, embodying with it a plan for the commutation of dues by one payment.

PROPOSED AMENDMENT TO ARTICLE XXXIII.

Amend Article XXXIII. so that it will read as follows :

Proposed amendments to this Constitution must be submitted in writing, signed by not less than five members, on or before the first Wednesday in November, and shall be sent by letter to the members of the Society, at least twenty-five days previous to the annual meeting.

Such amendments shall be in order for discussion at such annual meeting, and may be amended in any manner pertinent to the original amendments by a majority vote of the annual meeting, and if so amended, shall be voted upon by letter-ballot in form as amended by the annual meeting; if not so amended, they shall be voted upon by letter-ballot as submitted; the vote to be counted at the first regular meeting in March.

An affirmative vote of two-thirds of all ballots cast shall be necessary to the adoption of any amendment.

The above amendment is proposed by the following-named members of the Society : William P. Shinn, Charles E. Emery, Joseph P. Davis, G. S. Greene, Jr., and William H. Paine.

PROPOSED AMENDMENT.

A new Article :

Whenever twenty or more members shall signify their desire to form a Section of this Society for the advancement of a special branch of engineering, the Board of Direction shall consider such application, and submit it with an expression of opinion to the Society for a letter-ballot. The application shall be granted if two-thirds of the votes be in the affirmative.

Sections authorized as above shall have the privilege of separate meetings for reading of papers and discussions at times and places determined by themselves, but may not assume to transact business in the name of the Society.

The transactions of such sections shall be published by the Society under the usual regulations; but no expense other than for such publication shall be borne by the Society.

The above amendment is proposed by the following-named members of the Society : D. M. Currie, Henry Flad, B. M. Harrod, Smith S. Leach, Robert E. McMath, J. A. Ockerson, H. D. Whitcomb, Thomas J. Whitman, and George Y. Wisner.

On account of the joint meeting of the American Society of Civil Engineers, the American Institute of Mining Engineers, and the American Society of Mechanical Engineers which had been arranged to take place this evening, the meeting of the Society was adjourned to Wednesday evening, November 15th, at 8 P. M., at which time the tellers to canvass the ballots for membership were requested to report.

NOVEMBER 15TH, 1882.—The Society, adjourned from November 1st, met at 8 P. M., Vice-President Wm. H. Paine in the chair.

The tellers to canvass the ballots for membership made their report, and the following candidates were declared elected as members :

Augustus Jesse Bowie, Jr., San Francisco, Cal. ; Collinson Pierrepont Edwards Burgwyn, Richmond, Va. ; Edgar Sheldon Cary, Newburgh, N. Y. ; Frank Hudson Clement, Everett, Pa. ; Frederick Y.

Dabney, Monroe, La.; Edward Prince (elected Junior, February 6th, 1878), Quincy, Ill.; George M. Rusling, Newburgh, N. Y.; Edward Yorke, Guadalajara, Mexico.

An abstract was then read of the answers received to a letter from the President and Secretary of the Society relating to the proposed programme for tests of structural materials, to be furnished to the Ordnance Department of the United States Army, in accordance with the provisions of the law passed at the last session of Congress.

The subject was discussed by members present.

CONTRIBUTIONS TO THE BUILDING FUND.

By a resolution of the Board of Direction, all contributions to the Building Fund are to be acknowledged, from time to time, by printing lists of the same in the monthly Proceedings of the Society, and in addition to this the names of all those who may subscribe $100 or more are to be regularly enrolled and published in future lists of the Society under the head of Subscribers to the Building Fund, and they will be entitled to receive one copy of the monthly publications, comprising all papers and transactions of the Society, regularly, for life, for each $100 subscribed by them; such copies to be in addition to those which they may be already entitled to if they are Members or Fellows.

The following contributions are acknowledged in addition to those heretofore noted:

Clarke, Reeves & Co.	$1 000.00
John W. Bacon	100.00
E. B. Van Winkle	100.00

ADDITIONS TO LIBRARY AND MUSEUM.

From Association of Engineering Societies, H. G. Prout, Secretary of Board, New York:

Journal of the Association. Vol. I., Nos. 10 and 11. August and September, 1882.

From B. Baker, London, England:

The Forth Bridge. B. Baker. London, 1882.

From Robert Ballard, Rockhampton, Queensland, Australia:

The Solution of the Pyramid Problem, or Pyramid Discoveries, with a new Theory as to their Ancient Use. Robert Ballard. New York, 1882.

Photographs of Queensland Railways.

From Henry T. Bovey, Montreal, Canada:

Applied Mechanics. Henry T. Bovey, M. A. Montreal, 1882.

From Bureau of Education, Washington:

Report of the Commissioner for 1880.

From Engineers' Society Western Pennsylvania, Pittsburg:

On the Commercial Value of Heating Furnaces of different Types. Ign. Hahn.

From John M. Goodwin, Sharpsville, Pa.:

Testimony, etc. The Pennsylvania Company, operating the Erie and Pittsburg Railroad, and the Erie and Pittsburg Railroad Company *vs.* the Sharpsville Company.

From Gen. Wm. B. Hazen, Chief Signal Officer, U. S. A., Washington:

Report on the Character of Six Hundred Tornadoes. Sergt. J. P. Finley, Signal Corps U. S. A.

Signal Service Tables of Rainfall and Temperature compared with Crop Productions. 1st Lieut. H. H. C. Dunwoody.

From Clemens Herschel, Holyoke, Mass.:

Testing Flume of the Holyoke Water Power Company, at Holyoke, Mass., July 24, 1882.

From G. Howard-Ellers, Chicago:

Annual Report on the General Sewerage System of the City of Chicago for the year 1881. G. Howard-Ellers, Chief Engineer.

From Institution of Civil Engineers, James Forrest, Secretary, London:

Minutes of Proceedings. Vols. LXIX. and LXX.

Publications edited as follows:

Abstracts of papers published in Foreign Transactions and Periodicals. Session 1881–82. Part III.

System of Unloading and Storing Coals at the Beckton Station of the Gas Light and Coke Company. George C. Trewby.

Harbors and Estuaries on Sandy Coasts, with discussion. Leveson Francis Vernon-Harcourt.

Breaking up a Wreck by Dynamite on the lower Danube. Charles H. L. Kühl.

The Measurement of Velocity for Engineering Purposes. Henry S. H. Shaw.

Account of some Tests of Riveted Joints for Boiler Work. Charles H. Moberly.

Reconstruction of the St. Pinnock and Moorswater Viaducts on the Cornwall Railway. Peter J. Margary.

Plant for the Manufacture of Iodine. Robert Harvey.

The Regulation of Rivers and Waterways with a view to the Prevention of Floods. Gustav Ritter Von Wex. Translated from the German by William A. Bell.

Seacombe Ferry Improvement Works. Wilfrid S. Boult and John J. Potts.

Coal-Washing. Thomas F. Harvey.

The recent Landslips in the Salt Districts of Cheshire. Edward L. Williams.

Dioptric Apparatus in Lighthouses. Alan Brebner.

Buckie Harbor. James Barron.

The Independent Testing of Steam Engines and the Measurement of Heat used. John G. Mair.

Description of a Composite Screw Tug-Boat. John A. Thompson

Bo'ness Harbor and Dock Works. Patrick W. Meik.

Corn-Mill Machinery:

I. Various Systems of Grinding Wheat, and the Machines used in Corn-Mills. William P. Baker.

II. Modern Flour-Milling in England. Henry Simon

III. Roller-Mills, and Milling as practiced in Budapest. William B. Harding.

From William P. Judson, Oswego, N. Y.:

Specifications for Improving Channel at Ogdensburg Harbor, N. Y.

Specifications for Extension of the Oswego Breakwater.

Specifications for Extension of the Piers at Little Sodus Harbor, N. Y.

Specifications for Extension of the Piers at Great Sodus Harbor, N. Y.

Specifications for Extension of the West Pier at Putneyville Harbor, N. Y.

Specifications for Extension of the Piers at Charlotte Harbor, N. Y.

Specifications for Extension of the Piers at Wilson Harbor, N. Y.

Specifications for Extension of the Buffalo Breakwater.

From J. Fras Le Baron, Jacksonville, Fla.:

Annual Reports of the Cochituate Water Board of Boston for the years 1861, 1866, 1867, 1868, 1871, 1872, 1874, 1875.

Report of the Committee to examine the Sources of Water Supply for the City of Providence. Boston, 1868.

Eighth Quarterly Report of the Water Commissioners of Providence. Providence, 1871.

Report of the Chief Engineer of Providence Water Works. Providence, 1871.

Specifications of Materials to be furnished and Work to be executed for Catch-Basins, Drains and Sewers. Lynn, Mass.

Report of Joint Special Committee on Introduction of Water for the City of Lynn, with reports of the Engineer and Chemist. September, 1870.

First and Third Annual Reports of Public Water Board of the City of Lynn.

Report of Jas. P. Kirkwood, C. E., in relation to an additional Water Supply for the City of Lynn, Mass. Lynn, 1876.

Report of the Joint Special Committee on a Supply of Water for Lowell, Sept., 1869. Lowell, Mass.

Thirteenth Annual Report of the Board of Public Works of Chicago year ending March 31, 1874.

First Annual Report of the Watuppa Water Board of Fall River, Mass., Jan. 1, 1875.

New Haven City Year Books for 1871–72 and 1872–73.

Statement of Receipts and Expenditures of the County of Middlesex, Mass., for the year 1872.

Third Annual Report of the Board of Health of Boston, 1875.

General Laws and Resolves passed by the Legislature of Massachusetts during the sessions of 1873–75–76.

Report upon Surveys made with the view of opening a steamboat communication from St. Johns River, Fla., by way of Topokalija Lake to Charlotte Harbor or Peace Creek, by Gen. Q. A. Gillmore, Corps Engs. U.S.A.

Metric System of Weights and Measures.

Florida: its Climate, Soil, Productions and Agricultural Capabilities.

Annual Report of the Trustees, Farm Superintendent and Treasurer of the Maine State College of Agriculture and the Mechanic Arts, 1872. Augusta, 1872.

The Metric Reform. From *Scribner's Monthly*, July, 1879.

Our American Italy. Information for the Settler and the Tourist.

Landscape Gardening and Thorough Drainage. Charles Follen and J. H. Shedd. Boston, 1859.

Eighth Annual Report of the Commissioners of Fisheries of the State of New York for the year ending Dec. 31, 1875.

Office of the Trustees, Sanitary Improvement Bonds, Jacksonville, Florida, Sept. 16, 1878.

First Annual Report of the Commissioners of the State Parks of the State of New York, May 15, 1873. Albany, 1874.

Massachusetts Railroads, 1842, 1855.

Third Annual Report of the Board of Rail-

road Commissioners of Massachusetts. Boston, 1872.

A Bill to incorporate the Boston and Chicago Railway Trust Co. Boston, 1874.

Hoosac. The Last Agony of the Great Bore. T. W. Bird. Boston, 1868.

Report of Hon. Alvah Crocker on the Troy and Greenfield Railroad and Hoosac Tunnel. Boston, 1868.

Report of the Joint Standing Committee on the Troy and Greenfield Railroad for 1869, 1870, 1872.

Report of the Corporators of the Boston and Hoosac Tunnel Railroad Company. January, 1875.

Lexington and Arlington Branch of Fitchburg Railroad. Abstract of Argument of E. H. Derby before the Railroad Committee. (2 copies.)

Board of Harbor Commissioners, 11th Annual Report, Jan., 1877. Boston, Mass.

Report of Experiments and Observations on the Concord and Sudbury Rivers, in the year 1861.

Report of the Commission of Engineers appointed to investigate a permanent plan for the Reclamation of the Alluvial Basin of the Mississippi. Washington, 1875.

Report of the Engineer-in-Chief of the Illinois and St. Louis Bridge Company, St. Louis, Mo. May, 1868.

Improvement of Charleston Harbor, S. C. Washington, 1878.

Report of the Superintendent of the United States Coast Survey, showing the Progress of the Survey during the year 1873.

Smithsonian Reports, 1873 and 1874.

School Committee; Report of the Committee on Drawing. Boston, 1874.

Annual Report of the Massachusetts Agricultural College, 1866.

The Mineral Wealth, Climate and Rainfall and Natural Resources of the Black Hills of Dakota. Walter P. Jenney, E. M. Washington, 1876.

From M. Lavoinne, Paris, France:

Notice sur la Construction du Viaduc, de Chastellux. M. Lavoinne.

From MM. Lavoinne and Pontzen, Paris, France:

Les Chemins du fer en Amerique. Tome II. Exploitation, Chemins de fer a voie, Etroite et Tramways. MM. Lavoinne et E. Pontzen. Paris, 1882.

From His Worship the Mayor, Montreal, Canada:

Annual Report of the City of Montreal for 1881.

From Midland Institute, Mining, Civil and Mechanical Engineers, Barnsley, England:

Transactions, Vol. VIII., Part LXI. August, 1882.

From Charles Paine, New York:

The Drive Well Cases. Appellant's Brief. U. S. Supreme Court, October Term, 1882. George Payson and William Niles, of Counsel. La Porte, Ind., 1882.

From Richard Potts, Chicago:

Sixth Annual Report of the Department of Public Works, City of Chicago, year ending Dec. 31, 1881.

From Royal United Service Institution, London, England:

Journal of the Institution, Vol. XXVI., No. 116.

From W. H. Shock, Engineer-in-Chief, U. S. N., Washington:

Steam Boilers: their Construction and Management. William H. Shock. New York, 1880.

From Frederick H. Smith, Baltimore, Md.:

Rocks, Mineral and Stocks. F. H. Smith. Chicago, 1882.

From U. S. Light House Board, Washington:

Aberrations of Audibility of Fog Signals. Arnold B. Johnson. Washington, 1882.

From U. S. Naval Institute, Annapolis, Md.:

Proceedings, Vol. VIII., No. 2.

From U. S. Ordnance Department, Washington:

Index to Ordnance Notes. Nos. 168 to 205, inclusive. Ordnance notes as follows:

Field-Gun Carriage. Henry J. Butler, M. Inst. C. E.

Small-Arm Firing. Capt. O. E. Michaelis, U. S. A.

The Attack of Armor-Clad Vessels by Artillery.

From Leveson Francis Vernon-Harcourt, London, England:

Harbors and Estuaries on Sandy Coasts. L. F. Vernon-Harcourt, M. A. M. Inst. C. E.

From Gen. H. G. Wright, Chief of Engineers, U. S. A., Washington:

Report of an Examination of the Upper Columbia River and the Territory and its Vicinity. Lieut. Thomas W. Symons.

Report of the Committee on Foreign Affairs on the Nicaragua Canal.

From A. F. Wrotnowski, Vera Cruz, Mexico:

Plan of the Works projected by James B. Eads for the Harbor of Vera Cruz.

From other sources:

Report of the President of Northern Pacific Railroad to the Stockholders, at their Annual Meeting, Sept. 21st, 1882.

Railways in Mexico. An Article by Senor Don Matias Romero, in answer to an article of the Hon. John Bigelow, entitled "The Railway Invasion of Mexico," published in *Harper's New Monthly Magazine*, October, 1882.

Annual Report of the Chicago and North-Western Railway Company for year ending May 31st, 1882.

First Annual Report of the Columbus, Hocking Valley and Toledo Railway Company, year ending December 31st, 1881.

Report of the Sub-Committee of the Committee on Cities, relative to Investigating the Feasibility of Underground Telegraphy in Cities, together with the testimony taken at the investigation. New York, 1882.

Report of the New York State Survey for the year 1880. James T. Gardiner, Director.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
Bowie, Augustus J., Jr.	P. O. Drawer 2220, San Francisco, Cal.	Nov. 1, 1882.
Burgwyn, C. P. E.	U. S. Ass't Engineer, 905½ Main St., Richmond, Va.	Nov. 1, 1882.
Cary, Edgar S.	Res. Engineer, New York, Ont. and W. Ry., Newburgh, N. Y.	Nov. 1, 1882.
Clement, Frank H.	Div. Engineer South Penna. R. R., Everett, Pa.	Nov. 1, 1882.
Dabney, Frederick Y.	Chief Engineer and Supt. Vicksburg, Shreveport and Pacific R. R., Monroe, La.	Nov. 1, 1882.
Prince, Edward	(Elected Junior Feb. 6th, 1878), Supt. Water Works, Quincy, Ill.	Nov. 1, 1882.
Rusling, George M.	Engineer for Contractors, New York, West Shore and Buffalo R. R., Newburgh, N. Y.	Nov. 1, 1882.

CHANGES AND CORRECTIONS.

MEMBERS.

Allen, C. Frank	A., T. and S. F. R. R., Topeka, Kansas.
Cunningham, D. W.	30 South 7th St., Minneapolis, Minn.
Durham, C. Wheeler	187 Broadway, New York City, N. Y.
Earley, John E.	(Care W. R. Morley, Chief Engineer Mex. Cent. R. R.), Chihuahua, Mexico.
Fogg, Charles E.	Poughkeepsie, N. Y.
Hering, Rudolph	Room 18, Tribune Building, New York City, N. Y.
Kinney, Edward C.	Fort Worth, Texas.
Neilson, Charles	Supt. B. and R. Div. N. Y., L. E. and W. R. R., Buffalo, N. Y.
Noble, Alfred	Shreveport, La.
Osgood, Joseph O.	Milton, Mass.
Pratt, William A.	Chief Engineer Western and Buckhannon R. R., Weston, Va.
Ray, Nathaniel C.	Ass't Engineer U. P. R. R., Boisé City, Idaho.
Simpson, George H.	Stamford, Conn.
Stauffer, D. McN.	Tribune Building, Room 18, New York City, N. Y.
Talcott, Cook	88 Cortlandt St., New York City, N. Y.
Wimmer, Sebastian	50 Irving Place, New York City, N. Y.

JUNIORS.

Parsons, W. Barclay	N. Y., L. E. and W. R. R., Bradford, Pa.
Raymond, Chas. Ward	173 Joralemon St., Brooklyn, N. Y.

FELLOW.

Merz, Frederick W.	7 West 31st Street, New York City, N. Y.

RESIGNATION.

Pettit, Henry	Elected Member January 7th, 1874.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. VIII.—December, 1882.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

DECEMBER 6TH, 1882.—The Society met at 8 P. M., Vice-President William H. Paine in the chair. Ballots for membership were canvassed, and the following candidates were declared elected members: Timothy Cookson Bradley, St. Joseph, Mo.; Henry J. Gielow, Town Creek, Ala.; Edward S. Safford, Newburgh, N. Y.; James Dix Schuyler, Sinaloa, Mexico; Thomas Wellington Spencer, Utica, N. Y.; Russell Thayer, Philadelphia, Pa.; Edmund Brownell Weston, Providence, R. I.

A paper on Underground Water Supply was then read by Mr. J. J. R. Croes, M. Am. Soc. C. E., and discussed by Messrs. Joseph P. Davis, George S. Greene, E. H. Keating and J. J. R. Croes.

DECEMBER 20TH, 1882.—The Society met at 8 P. M., Vice-President Paine in the chair.

A paper by William P. Shinn, M. Am. Soc. C. E., on the Increased Efficiency of Railways for the Transportation of Freight, was read by the author, and discussed by Messrs. Chanute, T. C. Clarke, Emery, G. S. Greene, Jr., Macdonald and Shinn.

OF THE BOARD OF DIRECTION.

DECEMBER 6TH, 1882.—Applications were considered. Appropriations were made. The Secretary was requested to prepare the Annual Report.

MEMOIRS OF DECEASED MEMBERS.

MAXIMILIAN HJORTSBERG, M. Am. Soc. C. E.

DIED MAY 16TH, 1880.

Maximilian Hjortsberg was born November 8th, 1825, in Stockholm, Sweden. He was the youngest son of Lars Hjortsberg, a very eminent actor of Sweden. After his early education he was apprenticed to a builder in Stockholm, and subsequently attended the Polytechnic School in that city. At the age of 19 he went to London, where he was engaged as assistant with a number of prominent engineers, among them Mr. Robert Stephenson, finally being employed upon the construction of the docks at Hull and railway work in that vicinity for about two years.

In 1850 he visited the United States, and, with the exception of a short time in Sweden, he resided since that date in America. He was engaged upon railroad work in Indiana and other States until 1857, when he received an appointment in the engineer service of the Chicago, Burlington & Quincy Railroad, from which he was soon advanced to the position of Chief Engineer. This position he occupied up to 1879, and was distinguished as an important and valuable officer in the perfection of the construction and maintenance of that well-known line. The engineering work was of large extent and of excellent character, and Mr. Hjortsberg became well known as a man of peculiar ability, judgment and energy.

Besides his duties connected with the railroad, he superintended the construction of one of the fine churches in Chicago, rebuilding it also after the great fire. He was also one of the Park Commissioners of that city, and in that capacity had an opportunity for the exercise of his decided artistic tastes. During the last two years of his life he was the Engineer of the Pullman Palace Car Company and was engaged in the construction of their works near Chicago.

He was a man appreciated very highly by other members of our profession, and the sad accident by which he lost his life was deeply felt.

He became a member of the American Society of Civil Engineers July 10, 1872.

WILLIAM WIERMAN WRIGHT, M. Am. Soc. C. E.

DIED MARCH 9TH, 1882.

William Wierman Wright was born July 27th, 1824, at York Springs, Adams County, Pennsylvania. He came of a Quaker family well known in that part of the State. He was educated at the schools of the neighborhood, and finished his education at the Academy at Gettysburg, under the charge of General Herman Haupt, C.E. He began his engineering career in 1847, under Samuel W. Mifflin, who was in charge of the Mountain Division of the Pennsylvania Railroad, extending from Jack's Narrows to the summit of the Allegheny Mountains. He continued until 1854 in the service of the Pennsylvania Railroad in different grades, up to principal Assistant Engineer, in charge of the Western Division of the main line. While in this service he supervised the construction of the Indiana Branch and the erection of the freight depot at Pittsburgh. In 1855 he became the Chief Engineer of the Memphis & Charleston Railroad. In 1857 he was engaged in the service of the Honduras Interoceanic Railroads, under the direction of Mr. John C. Trautwine, C.E., being in Honduras from May, 1857, till May, 1858.

Returning to New York at that time, he was sent to England in the service of the Honduras Company, and traveled extensively in Europe, returning to the United States in 1859. He was subsequently connected with the Waynesburg Branch of the Pennsylvania Railroad up to the beginning of the war, when he entered the service of the Government, and was connected with the Military Railroad Department to the close of the war. In this capacity his services were of the most valuable character.

He was engaged at Washington and Alexandria, and was in charge of the Acquia Creek Railroad, building extensive wharves at that point, and in 1863 was Military Superintendent of Transportation at Harrisburg. In1864 he was Chief Engineer of the Military Railroads in the Division of the Mississippi, having the appointment also of Colonel of United States Volunteers.

He organized and had charge of a Military Railroad Construction Corps, which did very effective service at Chattanooga, Nashville, and other points. At the close of 1864 he was ordered by General Sherman to Savannah, where he arrived with his construction corps of 1,200 men January 13th, 1865, and was put in charge of the military railroad work in that vicinity. He was present with General Sherman at the time of the negotiations with General Johnston, which closed the war.

In the charge of the work of this Military Railroad Construction Corps during the war, General Wright exhibited remarkable ability, and his operations were of the greatest advantage to the United States Army.

The corps was disbanded May 15th, 1865, and in 1866 he left the military service of the Government, and became General Superintendent of the Eastern Division of the Kansas Pacific Railway; exchanging this position in 1867 for that of Chief Engineer of the same company, in charge of the surveys for the proposed extension of the road to the Pacific Coast. He pushed these surveys with energy until 1868, when he became connected with the Kansas and Missouri Bridge Company at Leavenworth.

He was subsequently connected with the Chicago and Atchison Bridge over the Missouri River, and with many other railroad works in the West.

In 1870 he became Chief Engineer of the Shenandoah Valley Railroad in Virginia, and supervised the surveys for that railroad. He returned to Philadelphia in 1874, when he engaged in general engineering practice.

In 1879 and 1880 he was a member of the Commission of Engineers, convened in the City of Panama by M. de Lesseps, to examine and report upon the proposed route for the Interoceanic Canal.

It will be seen that few American engineers have had a more active or energetic career, and the constant professional engagements confided to General Wright up to the later years of his life prove that his engineering ability was well recognized.

General Wright became a member of the American Society of Civil Engineers March 3d, 1875.

CHARLES W. HOWELL, M. Am. Soc. C. E.

DIED APRIL 5TH, 1882.

Major Charles W. Howell, of the Corps of Engineers of the United States Army, died at New Orleans, Louisiana, April 5th, 1882. He was born in Goshen, Indiana; entered the United States Military Academy in 1859, and graduated June 11th, 1863, standing seventh in his class. He was made immediately after graduation First Lieutenant of the Corps of Engineers, and continued attached to that corps to the close of his life. He served with distinction as Military Engineer of the Army of the Potomac, taking part in a number of actions, and being present at the capitulation at Appomattox Court House, April 9th, 1865. He received in 1864 the brevets of Captain and of Major, for gallant and meritorious service. After the war he was for one year with the engineer battalion at Willet's Point, New York harbor, and then was engaged in the work of the improvement of Western rivers until 1868, when he took charge of a survey for the Kansas Pacific Railroad, under the direction of the Secretary of the Interior, making the surveys from

Fort Riley to intersect the Union Pacific Railroad at the 100th meridian. He was subsequently Chief Engineer of the Department of the Missouri, and in June, 1869, he was detailed to New Orleans, in charge of works of public improvement in Louisiana, Texas and the Gulf Coast of the State of Mississippi, in which work he continued until his death. These works were of considerable local importance, and were sufficient to keep Major Howell very actively engaged up to the time when his health, which had been for a long while impaired, forced him to leave his duties.

He became a member of the American Society of Civil Engineers March 3d, 1875.

ADDITIONS TO

LIBRARY AND MUSEUM.

From S. Thayer Abert, Washington, D. C.:

Annual Report upon the Improvement of Rivers and Harbors in the District of Columbia, Maryland, Virginia and North Carolina. S. Thayer Abert, U. S. Civil Engineer.

From Aeronautical Society of Great Britain, Fred. W. Breary, Hon. Secretary, London :

Sixteenth Annual Report of the Society for the year 1881.

From American Academy of Arts and Sciences, Boston :

Proceedings of the American Academy of Arts and Sciences. New Series. Vol. IX. From June, 1881, to June, 1882.

From Association of Engineering Societies, H. G. Prout, Secretary of Board, New York :

Journals. Vol. I, No. 12, October, 1882. Vol. II, No. 1, November, 1882.

Index, Vol. I. November, 1881, to October, 1882.

From Babcock and Wilcox Company, New York :

Useful Information pertaining to the Generation and Use of Steam. 2 copies. October, 1882.

From Board of Supervisors, San Francisco, John A. Russell, Clerk :

Municipal Reports of San Francisco for 1881–82.

From American Institute Mining Engineers, Dr. T. M. Drown, Secretary, Easton, Pa.:

The Mines and Mills of Gilpin County, Colorado. A. N Rogers.

Some Drift Hematite Deposits in East Tennessee. Edward Nichols.

The Crystalline Rocks of Virginia, compared with those of New England. Prof. C. H. Hitchcock.

A Native Process of Smelting Copper Ores in the State of Jalisco, Mexico. Walter B. Devereux.

High Percentage of Lime in Lead Shafts-furnace Slags. Albert F. Schneider.

Comparison of Various Methods of Copper Analysis. W. E. C. Eustis.

Notes on the Geology and Mineralogy of San Juan County, Colorado. Theodore B. Comstock.

The Mineral Regions of Southern New Mexico. B. Silliman, M.D.

Notes on some Reactions of Titanium. Mrs. Ellen H. Richards.

Presence of Tellurium in Copper. T. Egleston.

Some Peculiarities in the Occurrence of Gold in North Carolina. Prof. W. C. Kerr.

Assaying of Silver Bullion. F. C. Blake.

Hot-Blast Stoves at the Edgar Thompson Furnaces "D" and "E." Julian Kennedy.

The Comparative Efficiency of Fans and Positive Blowers. H. M. Howe.

The Occurrence of Gold in the Potsdam Formation, Black Hills, Dakota. Walter B. Devereux.

Notes on the Relation of Manganese and Carbon in Iron and Steel.

Charcoal as a Fuel for Metallurgical Processes. John Birkinbine.

Hœfer's Method of Determining Faults in Mineral Veins. R. W. Raymond.

The Anthracite Coal-beds of Pennsylvania. Chas. A. Ashburner.

On the Peculiar Features of the Bassick Mine. L. R. Grabill.

Sliver Milling in Arizona. W. Lawrence Austin.

Proceedings of the Colorado Meeting, August, 1882.

The Estimation of Mineral Oil in the Presence of other Oils. Chas. C. Hall.

From Boston Public Library:

Bulletin. October, 1882.

From Bureau of Education, Washington, D. C.:

Circulars of Information, as follows:

No. 2, 1882. Proceedings of the Department of Superintendence of the National Educational Association at its meeting at Washington, March 21-23, 1882.

No. 3, 1882. The University of Bonn.

No. 4, 1882. Rural School Architecture.

National Pedagogic Congress of Spain.

Natural Science in Secondary Schools.

Instruction in Morals and Civil Government.

From Dr. C. F. Chandler, Dean of the Faculty School of Mines, Columbia College, New York:

Circular of Information, School of Mines, 1883-84.

From Clarke, Reeves & Co., Phœnixville, Pa.:

Two framed photographs of Kinzua Viaduct.

From Wm. Paul Gerhard, New York:

First Report of the Royal Sanitary Commission. London, 1869.

House Drainage and Sanitary Plumbing. Wm. Paul Gerhard. New York, 1882.

From George S. Greene, Jr., New York:

Annual Report of the Department of Docks. April 30. 1882. (Several copies.)

From Institution of Civil Engineers, London:

Abstract of Papers in Foreign Transactions and Periodicals. Vol. LXX. Session 1881-82. Part IV.

From Institute of Engineers and Shipbuilders, Glasgow, W. J. Millar, Secretary:

Transactions. Vol. XXV. 1881-82.

The Dimensions of Cast Iron at various Temperatures, with more special reference to the phenomena of the solid floating on the molten metal. W. J. Millar, C.E.

From Institute of Mechanical Engineers, London:

Proceedings. August, 1882. Leeds Meeting.

From Wm. P. Judson, Oswego, N. Y.:

Specifications for the Extension of the Oswego Breakwater. November 23, 1882.

Specifications for the Extension of the Buffalo Breakwater.

From John Kennedy, Montreal:

Report on the St. Lawrence Bridge and Manufacturing Scheme. John Kennedy. Montreal, 1882.

From J. Francis Le Baron, Jacksonville, Fla.:

Specifications for River and Harbor Improvements—Fla., Texas, Wis., Minn., Pa., Mich., Miss., Me., N. H., Mass., R. I., Conn., N. C., N. J., Va., Md., Del., Ill., Iowa, Cal. Dredging, Jetties, Dams, Revetments, Dykes, Piers, Crib-work, Dredges, Tugs and Scows.

Florida: Its History, Topography, Climate, Soil, Resources and Natural Advantages. A. A. Robinson. Tallahassee, 1882.

From John Lockwood, New York:

Bolt from Flanged Pipe on Force Main of New Brighton, Staten Island, Water Works, cut off by sand blast from a leak. Had been in a year when discovered.

From Capt. D. A. Lyle, U.S A., Boston:

Report on the Manufacturing and Use of Files and Rasps. Capt. D. A. Lyle and Samuel W. Porter.

From the Massachusetts Institute of Technology, Boston:

Abstract of the Proceedings of the Society of Arts for 1879, 1880, 1880-1881, 1881-1882.

From W. H. McFadden, Philadelphia:

Annual Report of the Philadelphia Water Department, 1881.

From Isaac Newton, New York:

Report of the Department of Public Works for the Quarter ending December 31, 1880, and Annual Report for 1881.

From North of England Institute of Mining Engineers:

Transactions, Vol. XXXI., 1881-2.

From H. V. and H. W. Poor, New York:

Manual of the Railroads of the United States. H. V. Poor. New York, 1882. 15th Annual Number.

From Charles Paine, New York:

Prospectus. Chicago, St. Louis and New Orleans Railroad Co. W. H. Osborn. Dec. 30, 1882.

From Pi Eta Scientific Society, Troy:

Papers read before the Society. Vol. 2, No. 5, December, 1882.

From Seismological Society of Japan:

Transactions. Vol. IV., January to June, 1882.

From Société des Ingénieurs Civils, Paris:

Memoirés. August and September, 1882.

From Robert Surtees, Ottawa, Canada:

Annual Report of the Water Works Committee, with Official Reports for 1882.

From United States Lighthouse Board, Washington:

Annual Report of United States Lighthouse Board for the year ending June 30, 1882.

From United States Naval Institute, Annapolis, Md.:

Proceedings. Vol. VIII., No. 3, 1882.

From George L. Vose, Boston:

The Training for Students in Civil Engineering. George L. Vose. New York, 1882.

From W. L. Webber, East Saginaw, Mich.:

Inter-State Commerce. Its Regulation by Congress. W. L. Webber.

From H. M. Wightman, Boston:

Ninth Annual Report of the Boston Water Board. Boston, 1882.

From Chas. E. Wright, Commissioner of Mineral Statistics, Marquette, Mich.:

Annual Report of the Commissioner of Mineral Statistics of the State of Michigan for 1882. Lansing, 1882.

From Ordnance Department, U. S. A. Gen. S. V. Benét, Chief, Washington, D. C.:

Ordnance Notes, as follows:

Tire-Upsetting Machine. Designed by A. T. Brewer. Captain John G. Butler. No. 206.

Torpedoes. Their Disposition and Radius of Destructive Effect. Lieut. Com. C. F. Goodrich, U. S. N. No. 207.

A Proposed Armament for the Navy. Com. E. Simpson, U. S. N. No. 209.

The Type of (I.) Armoured Vessel, (II.) Cruiser, best suited to the present needs of the United States. (Prize Essay, 1881.) Lieut. E. W. Very, U. S. N. No. 210.

The U. S. Steamer Alarm. Lieut. R. M. G. Brown, U. S. N. No. 211.

Chemical Theory of the Combustion of Gunpowder. R. Bunsen and L. Schischkoff. No. 212.

The Development of Armor as applied to Ships. Lieut. Jacob W. Miller, U. S N. No. 213.

Preservation of Wood. Prof. Chas. E. Monroe, U. S. N. A. No. 214.

The Employment of Torpedoes in Steam Launches against Men-of-War. Lieut. Charles Chabaud Arnault. No. 215.

Wallace's Intrenching Tool. Major N. W. Wallace. No. 217.

Deviations of Small-Arm Projectiles. Capt. John E. Greer. No. 225.

Recent Experiments with an 11-inch Compound Armor Plate at Shoeburyness. Maj. D. D. T. O'Callaghan, R. A.

The Supply of Ammunition to Infantry on the Feld of Battle. A. Mariotti.

On the Interior Economy of a Prussian Regiment. Capt. J. Rutherford Lumley.

The Bombardment of Alexandria by the English Fleet, July 11, 1882. Translated by Lieut. C. W. Whipple.

From John Wiley & Sons, New York:

The Railroad Spiral. Wm. H. Searles, C. E. New York, 1882.

From other sources:

Report of the Proceedings of the Sixteenth Annual Convention of the Master Car Builders' Association held in the City of Philadelphia, June 13, 14, 15, 1882. New York, 1882.

Papers on Mechanical Subjects. Sir Joseph Whitworth, Bart., F.R.S., D.C.L., LL.D. Vol. 1. True Planes, Screw Threads and Standard Measures.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

Date of Election.

GIELOW, HENRY J.....U. S. Asst. Engineer, Town Creek, Ala., Dec. 6, 1882.

SAFFORD, EDWARD S.....Div. Engineer, New York, West Shore and Buffalo R. R., Newburgh, N. Y., Dec. 6, 1882.

SCHUYLER, JAMES D.....Chief Engineer and Gen. Supt. Sinaloa and Durango R. R., Culiacan, Mex., *via* San Francisco and Mazatlan..... Dec. 6, 1882.

SPENCER, THOMAS W.....Div. Engineer New York, West Shore and Buffalo R. R., Utica, N. Y..... Dec. 6, 1882.

THAYER, RUSSELL.....Chief Engineer and Supt. Fairmount Park, 232 South Twenty-second St., Philadelphia, Pa ..... Dec. 6, 1882.

WESTON, EDMUND B.....Engineer Water Dept., Lock Box 1071, Providence, R. I..... Dec. 6, 1882.

YORKE, EDWARD.....Chief Engineer Pacific Line, Mexican Central R. R., Guadalajara, Xalisco, Mexico..... Dec. 6, 1882.

CHANGES AND CORRECTIONS.

MEMBERS.

BILLIN, CHARLES E.....Care Engineers' Club, 1518 Chestnut St., Philadelphia, Pa.

BLICKENSDERFER, ROBERT.Supt. Idaho Div. U. P. R. R., Pocatella, Idaho.

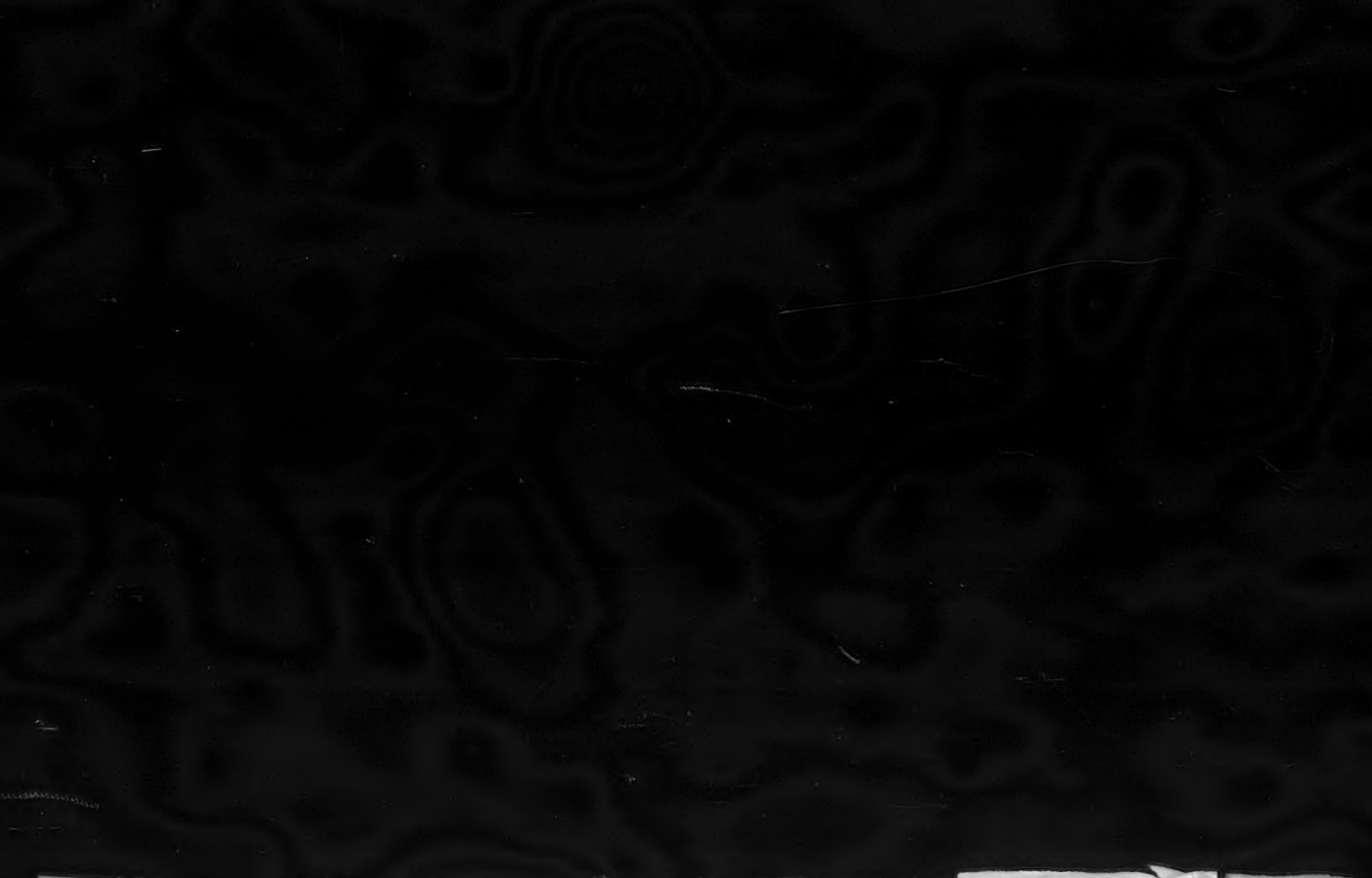
CANFIELD, EDWARD.....Supt. South. Div. N. Y., Ont. and W. Rwy, Tappan, N. Y.

CONSTABLE, CASIMIR.....2035 Seventh Ave., New York City, N. Y.
DUNCKLEE, JOHN B.....2136 Penn. Ave., Washington, D. C.
FORSYTH, ROBERT.....15 Walton Place, Chicago, Ill.
GLOVER, OLIVER L.....Chief Engineer, Salvador Cent. Rwy., La Union, Salvador, C. A.
HERMANY, CHARLES.....Chief Engineer Water Works, 549 Third St., Louisville, Ky.
NOBLE, ALFRED.....43 Campbell St., Detroit, Mich.
OLNEY, LAFAYETTE.....Newburgh, N. Y.
SEARLES, WILLIAM H.... Beach Creek, Clinton Co., Pa.
SEWALL, JOSEPH S.....481 Carroll St., St. Paul, Minn.
SEYMOUR, CHARLES.....Chief Engineer S. E. and S. E. R. R., Palestine, Ill.
SHINN, WILLIAM P.... ....Vice-President N. Y. Steam Co., 22 Cortlandt St., New York City, N. Y.
SYMONS, THOMAS W.....Lieut. Corps of Engineers, U. S. A., Hotchkiss, Tenn.
WIMMER, SEBASTIEN.....St. Mary's, Elk Co., Pa.

JUNIOR.

BURNHAM, GEORGE, JR....500 North Broad St., Philadelphia, Pa.

RESIGNATIONS.

MEMBERS.

BECKWITH, ARTHUR.....December 31, 1882.
COPELAND, GEORGE M....December 31, 1882.
LOWTHORP, FRANCIS C....December 21, 1882.